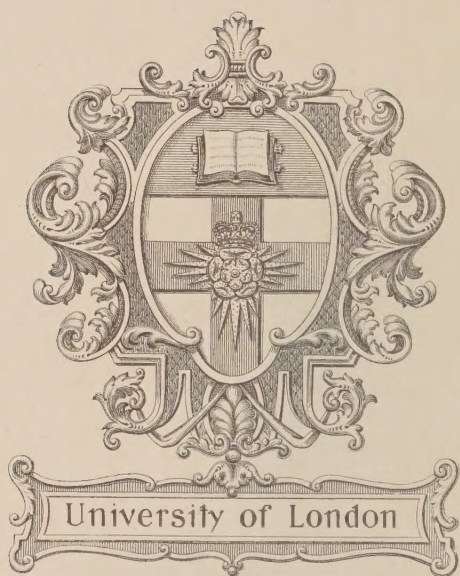
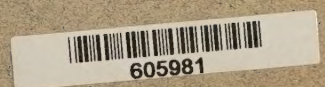








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ACCOUNTS AND PAPERS:

THIRTY-NINE VOLUMES.

—(15.)—

EAST INDIA.

BENGAL AND BOMBAY SANITARY COMMISSIONS;
CHINCHONA PLANT.

Session

1 *February* — 10 *August* 1866.

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ACCOUNTS AND PAPERS:

1866.

THIRTY-NINE VOLUMES:—CONTENTS OF THE

FIFTEENTH VOLUME.

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1

BENGAL SANITARY COMMISSION.



FIRST ANNUAL REPORT

OF THE

SANITARY COMMISSION FOR BENGAL, 1864-65,

WITH

APPENDIX, containing RETURNS of SICKNESS and MORTALITY among
TROOPS in the BENGAL PRESIDENCY from 1858 to 1864 ;

TOGETHER WITH THE

RESOLUTION of the Governor General of India in Council thereon,
dated 15th December 1865.

(PRESENTED TO PARLIAMENT BY HER MAJESTY'S COMMAND.)

*Ordered, by The House of Commons, to be Printed,
28 February 1866.*

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FIRST ANNUAL REPORT of the SANITARY COMMISSION for BENGAL, 1864-65; with APPENDIX, containing RETURNS of SICKNESS and MORTALITY among TROOPS in the BENGAL PRESIDENCY from 1858 to 1864; together with the RESOLUTION of the Governor General of India in Council thereon, dated 15th December 1865.

R E P O R T.

(No. 268.)

From *John Strachey*, Esq., President of the Sanitary Commission for Bengal, to Colonel *H. W. Norman*, C.B., Secretary to Government of India, Military Department.

Sir,

Simla, 30 June 1865.

I HAVE the honour to submit the Report of the Sanitary Commission for Bengal for the year 1864-65. In the orders under which the Commission was originally constituted, it was directed that "an Annual Report upon Public Health should be submitted to the Government by the Commission as soon after the 1st May as possible, treating of all the subjects that properly fall within its cognizance, and showing what has been done and proposed during the year." The Report will be in future prepared for the calendar year, in accordance with the orders that have lately been given by the Secretary of State and by the Government of India.

2. This being our first Report, it is desirable that we should state briefly the circumstances under which the Commission was appointed, and the nature of the duties that have devolved upon it.

Appointment and duties of the Sanitary Commission.

The appointment of a Sanitary Commission at each of the Presidencies in India was one of the recommendations made in the Report, submitted in May 1863, by the Royal Commission appointed to inquire into the sanitary state of the Army in India. It was recommended that these Commissions should be "so constituted as to represent the various elements, civil, military, engineering, sanitary, and medical; to give advice and assistance in all matters relating to the public health, such as selection of new stations, and the sanitary improvement of existing stations and bazaars; to examine new plans for barracks and hospitals; to advise on the laying out of stations and bazaars, the sanitary improvement of native towns, prevention and mitigation of epidemic diseases, and generally to exercise a constant oversight on the sanitary condition of the population, European and native; to report on the prevalence, causes, and means of preventing sickness and disease."

In accordance with this recommendation, and with the instructions of the Secretary of State, the formation of Sanitary Commissions was ordered by the Government of India, and in February 1864 the Commission for this Presidency was appointed. It was determined that the President of the Commission should be a civil officer, and the secretary a medical officer; and that one other medical, and two military officers, one of them an officer of engineers, should be members. The president and secretary were to devote their whole time to the work of the Commission; the duties of the other members were to be performed in addition to those of their regular offices. The orders of the Government of India, No. 1044, dated 29th February 1864, describe the nature of the work which the Commission was expected to perform, and indicate generally the intentions and wishes of the Government. It was stated that the primary object was the diminution of mortality in the Army, and the improvement of its sani-

tary condition, but that it was impossible that these objects should be attained unless measures were also taken for the improvement of the public health generally, and for the prevention of the more obvious causes of disease among the community at large. The Commission is a purely consultative body, and has no executive functions.

Objects of present Report.

3. The questions that have come before the Commission since it was appointed have been very numerous, and separate reports regarding many of them have been submitted to the Government. In those reports we have fully described the principal sanitary evils which have come to our notice, and have made suggestions for their removal. In the present report we shall, for the most part, deal with another side of the question. It will be less our object to point out the remedies for defects than to show the existing state of things; to describe the principal measures of sanitary importance which have been carried out or proposed during the past year by the Government; to give a true representation of the present sanitary state of the Army, and, so far as the imperfect means at our disposal will allow, of other classes of the population.

Present rate of mortality among the European troops in India lower than that stated by the Royal Commission.

4. The Report of the Royal Commission gave a very unfavourable account of the sanitary condition of the Army in India.

The statement, frequently reported in that Report, that 69 per thousand has been the average annual rate of mortality among the British troops in India, has been considered in a Despatch from the Government of India to the Secretary of State, which has been published and laid before Parliament, and the question has been so fully discussed, that it is unnecessary that we should again enter into it at length. It will be sufficient if we make a few remarks upon the subject.

That the average annual rate of mortality in the Army in India, between the years 1800 and 1856, was 69 per thousand, must be accepted as a fact, and when the Royal Commission declared that these figures represented the expense at which we had held dominion in India during the past century, the conclusion was undoubtedly correct. If nothing more than this had been asserted, there would have been no room for calling in question the justice of the statement, but it was assumed by the Commission that this rate of 69 per thousand represented the actual mortality in the Army in India at the time when the Report was issued; and this assumption is certainly not correct.

In 1857 the Royal Commissioners appointed to inquire into the Regulations affecting the sanitary condition of the Army, stated in their Report that the average annual rate of mortality in the infantry at home was 18·7 per thousand, and in the Foot Guards 20·4 per thousand. Since that time the rate of mortality in the army at home has been reduced to half the former amount, and it does not now exceed 9 or 10 per thousand. There is no more reason for saying that the average rate of mortality in the army in India is now 69 per thousand, than for saying that the rate in the army at home is 18 or 20 per thousand. The figures are as obsolete in the one case as in the other. The improvement in the health of the army has been immense in both countries; it has been effected in both cases during the same period, and it has been mainly due to the same cause, the great efforts that have been made to improve the condition of the soldier, and to protect him against the more serious causes of disease. It may be confidently stated that those efforts have been even greater in India than at home, and the result has been that the rate of mortality in India is probably not higher at the present time than that which prevailed 10 years ago in England.

We have stated that the death-rate of 69 per thousand for the period between 1800 and 1856, is to be accepted as a fact. For at least 10 years, however, before 1856, the average mortality was not nearly so high as this, unless in exceptional cases, when it was raised by war or by a violent epidemic of cholera. To make up the death-rate of 69 per thousand, all the deaths were included which occurred in the army during the first half of this century, a period of frequent war and commotion. This period includes the campaigns of Lord Lake and Sir Arthur Wellesley, against the Marhattas; the Pindaree war; the two Companies against Nepal; the two Burmese wars; one of them prolonged and fatal; the disastrous war in Afghanistan; the wars in Scinde and Gwalior, and the two wars in the Punjab with all their bloody battles. It was assumed by the Royal Commission, on the authority of Sir A. Tulloch, that 10

deaths

deaths per thousand out of the whole number, were due to the various wars between 1817 and 1855, but there is nothing to show what confidence this estimate deserves. It is, we think, unlikely that it should be worth much, for it is hardly possible, in a country like this, to estimate the amount of sickness and mortality caused by war. It may easily happen that troops far away from the scene of action may suffer more severely than those which are actually engaged with the enemy. Serious war in India almost invariably disturbs all military arrangements throughout the whole country; it often involves the necessity of marches in hot and unhealthy seasons; it throws additional labour upon the soldiers, wherever they may be stationed, and causes additional exposure to the climate.

To whatever extent the rate of mortality in the army in India may have been actually raised by the mode of calculation adopted by the Royal Commission, the principle involved appears to us to be faulty. It has been truly remarked that if we were to reckon up all the deaths that have taken place in the French army since the beginning of the century, including those which occurred in the great battles of the first Napoleon, and those of the three or four hundred thousand men who perished in the retreat from Moscow, if we were to quote the enormous death-rate which we should thus obtain as the normal rate of mortality in the French Army at the present time, and were to draw from this death-rate the conclusion that the present sanitary condition of the French Army was unsatisfactory, and discreditable to the existing Government of France, we should be taking a similar course to that which has been followed by the Royal Commission. We by no means, however, intend to assert that the exaggeration of the rate of mortality in the case of the army in India has been actually as great as it would be in the case which has been supposed.

In further illustration of our meaning, and by way of caution against placing a wrong value upon the figures which we have ourselves given in this Report, we borrow from the Report of the Cholera Commission the following remarks upon arithmetical averages: "People are too much in the habit of considering that average or mean results have necessarily a real signification and represent facts. Very often, although the assertion may seem paradoxical, this is far from being the case. An average or mean is strictly an abstract arithmetical idea, and in that sense every such means, properly calculated, is correct; but when we come to apply this abstract idea to facts, and to inquire its signification, we shall see that it may, in some cases, have no tangible or useful meaning whatever. Thus, if we had before us 100 objects, one of which was 1,001 feet high, while the remaining 99 were each one foot high, we should say quite correctly in one sense that the average height of the whole was 11 feet. But, in fact the height of none of the objects could be at all near to 11 feet, and the arithmetical idea could not have any useful significance. It would, in truth, confuse us, and lead us wrong instead of assisting our apprehension of the facts. In the example first given, a little consideration will show that the series of facts are not properly comparable; that we have one series of facts of one sort, and another of another sort; and that although we may arbitrarily and in an abstract way talk of them as a whole, yet in matter of fact they are distinct, and cannot properly be viewed together in respect of their height, the sense in which we have been considering them. The only legitimate way of dealing with such an assemblage of facts is to consider them in groups that are properly comparable. In very many cases the difference between false and true induction lies in our success in making such distinctions properly."*

We observe that this principle has been carefully acted upon in the preparation of the Medical Statistics of the French Army. Whenever a body of troops has been placed under circumstances which are evidently peculiar, it is considered that its statistics of mortality and disease must form the subject of special investigation, and must be kept entirely separate from those of the rest of the army which has been living under ordinary conditions.†

5. Before speaking in detail of statistical results, we desire to notice that nearly the whole of the figures given in the body of this Report are derived from

Dr. Bryden's statistical returns of sickness and mortality.

* Report of Cholera Commission, page 214.

† Vide "Statistique Médicale de l'Armée," 1862.

from Dr. Bryden's Tables; and it has been thought desirable to reprint the whole of these in an Appendix. We cannot acknowledge too fully the valuable assistance of every kind which Dr. Bryden has at all times given to us. For some time past he has been specially employed, under the orders of the Government of India, in the Statistical Branch of the Medical Department in Calcutta, in the preparation of these Returns. We believe them to be far more complete and trustworthy than any returns of the kind that have ever been published, and Dr. Bryden deserves the greatest credit for the manner in which, under circumstances of peculiar difficulty, this work has been performed. We had hoped to have been able to include with the present Report Dr. Bryden's remarks upon his own Tables, but it has been found more convenient to submit these to the Government separately. It will be highly interesting to learn the conclusions to which Dr. Bryden has been led by his minute study of these statistics of mortality and disease.*

Rates of mortality among the European troops in Bengal before the mutinies.

6. According to Dr. Bryden's Tables, the sickness, mortality, and invaliding among the European troops in the Bengal Presidency, including Burmah and Pegu, during the five years ending with 31st March 1857, were as follows:—

TABLE I.

Y E A R.	Average Strength.	Ratio per Thousand of Average Strength.				
		Daily Sick.	Admitted.	Died in Hospital.	Died out of Hospital.	Invalided.
1852-53 - - - - -	20,865	92·9	2,393	59·9	2·9	27·3
1853-54 - - - - -	21,505	77·8	1,887	46·6	2·0	25·5
1854-55 - - - - -	20,046	86·6	2,221	50·0	1·9	23·9
1855-56 - - - - -	19,885	81·7	2,247	33·1	1·4	27·7
1856-57 - - - - -	21,304	88·0	2,787	70·0	1·5	32·7

The excessive mortality in 1856-57 was due to a violent epidemic of cholera, which caused the death of 33 per thousand of the whole force. Although the average rates of mortality for the five years shown in the above Table is considerably less than the estimate of the Royal Commission, it will be seen that it was nevertheless extremely high. In other respects these figures are quite as unfavourable as those given by the Royal Commission. Their report states that "1,000 British soldiers at home experience about 1,000 attacks of sickness in the year, but in India the soldier's sickness is doubled. A battalion of 1,000 men (in Bengal) sent yearly, on an average, 2,045 cases to the hospitals: each soldier in India was exposed, therefore, to two attacks of illness in the year instead of one."† It is stated in another place that "on an average, in the stations in Bengal, 84 men in a battalion of 1,000 were constantly in hospital." These statements are quite borne out by the foregoing Table.

For the last nine months of 1857, the first year of the Indian mutiny, we have no returns in which we have confidence, but the circumstances under which the troops were placed were so entirely exceptional, that this is of little importance so far as our present objects are concerned. In 1858 the troops were exposed to almost as great an extent as in the previous year. The rate of mortality rose to 100·6 per thousand, of which all except 4·3 was due to disease, and

* It is desirable to notice that the term "European troops" used in this Report, and in Dr. Bryden's Tables, is the term which was commonly adopted in India before the amalgamation of the two armies, to include both Her Majesty's British troops and those in the service of the Indian Government. These Returns for "European troops" will therefore necessarily differ from those from Her Majesty's British forces; for all the years before the amalgamation was completed. In future, it will, we think, be desirable to discard the term "European troops" altogether.

Report, 8vo. edit. p. 29.

and not to loss in action. During the same year, the number daily sick was 122·6 per thousand, and the number admitted into hospital was 3,111 per thousand.*

7. With the return of peace in 1859, there was a great improvement in the health of the Army, although for a considerable part of the year the accommodation provided was necessarily insufficient, and the troops were still suffering from the effects of the mutinies. The following table shows the general results from 1859 up to the end of 1864.

Return of mortality among European troops from 1859 to 1864.

TABLE II.

Y E A R.	Average Strength.	Ratio per Thousand of Average Strength.				
		Daily Sick.	Admitted.	Died in Hospital.	Died out of Hospital.	Invalided.
1859 - - - - -	55,104	90·3	2,229	44·0	1·4	34·4 †
1860 - - - - -	48,901	83·9	2,052	35·6	1·1	34·4 †
1861 - - - - -	44,879	82·0	2,046	44·8	1·2	28·1
1862 - - - - -	42,980	76·8	1,971	26·8	1·3	31·5
1863 - - - - -	41,351	69·6	1,839	22·5	2·6	35·0
1864 - - - - -	40,385	62·1	1,641	19·5	1·4	36·8

8. In 1861 the most fatal epidemic of cholera occurred that has ever been known in India. During the year, there were 1,663 admissions, and 1,065 deaths in the Bengal Presidency from this disease. Of this number no less than 725 admissions and 450 deaths occurred at the single station of Meean Meer; including men, women, and children, the whole force at Meean Meer was 2,452, and out of this number 880 were attacked by cholera, and 535 died in the space of little more than a month. At Morar, during an almost equally short space of time, 152 soldiers died, out of 210 that were attacked. The Special Commission that was appointed by the Government of India to inquire into this epidemic was strongly of opinion that in both these cases the mortality was aggravated to an enormous extent by extreme mismanagement. If it had not been for this, the year 1861 would have formed no exception to the steady improvement that has been going on in the health of the army since 1859.

Rate of mortality in 1861 raised by epidemic cholera.

9. In a report submitted by our Commission last year, it was stated with reference to the Returns for 1863: "There are 46 principal military stations. In 28 of these, containing about three-fourths of the whole force, the death rate in 1863 was less than 20 per thousand; in 18 stations it was under 13 per thousand, and in eight stations it was under 10 per thousand. We have no access at present to the returns for Madras and Bombay, but we believe that it may be safely stated that the mortality in the army in India during the last two years has been little, if at all, more than 20 per thousand, the rate which prevailed among the Guards at home only six years ago, and which the Royal Commissioners in their report considered might become the death rate in India under improved sanitary conditions." It will be seen from the detailed returns given in the Appendix to this Report that the results in 1864 were still more satisfactory. The average rate of mortality for the army in this Presidency was lower than it had ever been in any previous year, except in Bengal Proper, and in the districts including Dinapore, Benares, Oudh, and Cawnpore, the average

Rates of mortality among European troops in 1863 and 1864.

* Vide Appendix.
† In consequence of the change made from 1st January 1860 in the period for furnishing the annual returns of the army in India, the invaliding of 1859 and 1860 has been mixed up. The mean for the two seasons has therefore been taken.

average mortality was less than 18 per thousand, and in the Punjab, which contains a larger proportion of the army than any other province in India, the rate was only 14·5 per thousand, or, excluding deaths out of hospital, only 13·2 per thousand.

Sickness and mortality among European troops in 1864.

10. The following table shows the amount of sickness and mortality among the European troops in the several provinces of the Bengal Presidency for the year 1864.

TABLE III.

PROVINCE.	Average Strength.	Ratio per Thousand of Average Strength.					
		Daily Sick.	Admitted.	Died in Hospital.	Died out of Hospital.	Died from all causes.	Died from cholera.
Bengal Proper - - -	2,002	61·9	1,510	20·5	4·5	25·0	2·5
Dinapoor, Benares, Oudh, and Cawnpore.	10,333	59·9	1,420	25·4	1·1	26·5	6·8
Meerut and Rohilkhund	5,950	72·4	1,688	16·8	·8	17·6	·2
Agra and Central India -	4,854	64·5	1,871	16·5	·8	17·3	·6
Punjab - - -	15,886	56·1	1,698	13·2	1·3	14·5	·06
Troops on the march, invalids, recruits, &c.	—	—	—	—	—	—	—
TOTAL Bengal Presidency	40,385	62·1	1,641	19·5	1·4	20·9	2·4

Great improvement in the health of the army.

11. The returns in the Appendix show that the army in this Presidency during 1864 was distributed at 54 stations. At 41 of these stations, occupied by nearly three-fourths of the whole force, the rate of mortality was less than 20 per thousand; there were only seven stations in which it exceeded 25 per thousand; and in 12 stations it was under 10 per thousand.*

The facts that have been stated fully justify the conclusion which has been expressed above, that the death-rate of 69 per thousand which the Royal Commission considered applicable to the army in India, when its report was written, has become entirely a thing of the past. The present rate of mortality in India hardly exceeds the rates which prevailed among the infantry and Guards at home for the 15 years ending with 1853, when they were 18 and 20 per thousand. It falls far short of the rate, 38 per thousand, which the Royal Commission considered to be applicable to the officers of the army in India; and it hardly exceeds the rate, 20 per thousand, which, according to the Commission, prevailed among the civil servants of the Government in India at the soldiers' ages, and among the native troops.

The foregoing tables show also that it is not only in the rate of mortality that there has been this great and progressive improvement. The number of men constantly sick, which before the mutinies, according to the very moderate estimate of the Royal Commission, was 84 per thousand, has gradually fallen until in 1864 it was 62 per thousand. It was 54·5 per thousand in the United Kingdom in 1861. In a similar manner, the number of annual admissions into hospital, which before the mutinies exceeded 2,000 per thousand men, has gradually fallen to 1,641 in 1864. It was 1,025 per thousand men in the United Kingdom in 1861.

Rates of mortality among European troops in Madras and Bombay.

12. We have no detailed returns showing the mortality of the army in Madras and Bombay during the last few years, but these Presidencies have almost always been more healthy than Bengal, and that there can be no doubt that the death-rate of 69 per thousand given by the Royal Commission for India generally is still less applicable to them than it is to us.

According to a Return, dated 30th May last, prepared at the Horse Guards, and presented to the House of Commons, the rates of mortality per thousand of

* This does not include the men at convalescent depôts, the rates of mortality at which are always, and necessarily, exceptionally high.

of average strength in Her Majesty's forces in the Madras and Bombay Presidencies during the last five years have been as follows:—

YEAR.	Madras.	Bombay.
1860 - - - - -	20·4	29·1
1861 - - - - -	15·7	21·3
1862 - - - - -	19·6	25·5
1863 - - - - -	19·2	13·2
1864 - - - - -	20·1	15·8

13. No proper arrangements having been organized for furnishing to our Commission regular returns and reports, the remarks will be very imperfect which we are able to make regarding the sickness and mortality at particular stations during 1864. It is hoped that in future we shall have access to more complete sources of information, under the arrangements which are now under the consideration of the Government, and which contemplate the establishment of an efficient system for recording and reporting all available facts of statistical and sanitary interest. Details for every station, showing the amount of sickness and mortality from all the principal diseases, will be found in the Appendix to this Report.

Stations at which the mortality exceeded 20 per thousand in 1864.

The following Table shows all the stations in which the mortality in hospital during the year exceeded 20 per thousand:—

TABLE IV.

STATION.	Average Strength.	Ratio per Thousand of Average Strength.					
		Daily Sick.	Admitted.	Died from Cholera.	Died in Hospital, not including Cholera.	Died out of Hospital.	Died from all Causes.
Barrackpore - - -	455	52·3	1,536	4·4	33·0	2·2	39·6
Berhampore - - -	202	48·9	1,253	-	24·8	-	24·8
Dinapore - - - -	968	75·4	1,693	5·2	17·6	1·0	23·8
Benares - - - - -	1,081	75·7	1,692	5·6	20·4	1·9	27·8
Lucknow - - - - -	2,470	60·4	1,706	15·8	27·9	·8	44·5
Cawnpore - - - -	1,131	57·9	1,292	5·3	19·5	·9	25·6
Allahabad - - - -	950	59·9	1,236	12·6	11·6	1·1	25·3
Delhi - - - - -	964	89·4	2,378	-	21·8	1·0	22·8
Saugor - - - - -	817	79·8	2,397	2·5	18·4	1·2	22·0
Umritsur and Govindgurh	501	68·0	2,293	-	24·0	-	24·0
Meean Meer - - -	910	62·8	1,713	1·1	22·0	2·2	25·3

14. The rate of mortality at Lucknow during 1864 was higher than in any station in this Presidency, being 44·5 per thousand, out of which amount 15·8 was due to cholera alone. The troops at Lucknow consisted of the 107th and 36th Regiments, the 5th Lancers, and four batteries of Artillery. The 107th is an old and seasoned regiment. It lost 22 men out of an average strength of 894, or 24·6 per thousand, and one half of the deaths occurred in one week from cholera. The Artillery lost only five men. The 36th Regiment arrived from England at the end of 1863, and reached Lucknow in a tolerably healthy condition in January. "It continued," writes the surgeon of the regiment, Dr. Bell, "in a good sanitary state till April, when the increasing heat of the weather began to tell on the young unseasoned soldiers, and fevers became prevalent. They presented no great variety; a few have been returned as 'common continued;' there were only 24 cases of 'intermittent;' the rest were returned as 'remittent,' but of these at least 10 cases might with equal correctness be called typhoid. * * The result is one for which I was wholly unprepared from my six years' experience in Madras, viz., that a typhoid fever almost identical with that of Europe, with ulceration of Peyer's glands prevails in this country, and is as fatal as at home. It seems the same disease in every respect, but that there are no petechiæ, and there is greater tendency to remis-

Mortality at Lucknow and other stations.

sions. From the inquiries I have made, I believe it to be a new disease in this country, and it is certainly a very fatal one. * * This disease prevailed all through the hot season, from July to October, and proved fatal in seven cases."

There were six cases of heat apoplexy, and all were fatal except one. They all occurred during the hottest weather of the year, and in the opinion of the medical officers were caused entirely by the intense heat. On the 15th September, cholera attacked the regiment, and proved fatal in 27 cases, all of which, with one exception, occurred within a week after the first outbreak of the disease.

There were six fatal cases of phthisis, and 39 men were invalided from the same cause. In 19 cases this disease was a sequela of fever. It has been thought that many of these cases which were recorded as phthisis may have been closely related to the fatal fever which has been noticed above; and there has been a suspicion that the great mortality from these diseases in this regiment may have been really due to an attack of the same fever which, as we have stated elsewhere, has proved so fatal in some of the gaols. This, however, is a point which cannot at present be cleared up. Altogether, the 36th Regiment lost 60 men during the year. We have made a special reference to the Medical Department on the subject of the fever which proved so fatal at Lucknow, and upon other points connected with the health of the troops at the station, and we hope that further information may be obtained. The 5th Lancers also suffered severely, losing 20 men during the year. A fever, which was apparently similar to that which prevailed in the 36th Regiment, proved fatal in five cases. There were three fatal cases of heat apoplexy and one of cholera.

The causes, independently of cholera, which led to the large mortality in the 36th Regiment and in the 5th Lancers, while the Artillery and the 107th Regiment escaped with comparatively little sickness, have not been explained, except by the fact that the two former were new to the country, and unacclimatized. It may be doubted whether this explanation is sufficient. We have not been able to discover that the local sanitary conditions under which the regiments were placed differed to any important extent, or that there were any special differences in the management of the men. In all cases, the amount of space allowed in barracks and hospitals appears to have been ample. The attack of cholera, which was so fatal, happily lasted for only a few days. Immediately on its appearance, the men were removed into camp, and there can be no doubt that this measure had the almost immediate effect of stopping the disease. Lucknow has, on several former occasions, suffered severely from cholera: but, with the exception of 1863, when the rate of mortality was 28·5 per thousand, the station has been, for some years past, healthier than the average. In 1861 the mortality was only 14 per thousand, and in 1862 it was 15·3 per thousand.

With the exception of Barrackpore, regarding which station further information has been called for, it will be observed from the foregoing table that in almost every case in which the rate of mortality exceeded 20 per thousand, cholera was the cause. The removal of the troops from the station was carried out in all instances, and in all with decided benefit.

The rate of mortality at Meean Meer was unduly raised by the death of eight men, who belonged to regiments at other stations.

The preceding table gives a good illustration of the manner in which the average rate of mortality for the whole army is often raised by an unusual number of deaths from some special causes, at a very few stations. The omission of the single station of Lucknow would reduce the death-rate for 1864 to 19·4 per thousand, and the omission of the 11 stations named in the table would reduce it to 17·8 per thousand.

Mortality caused
by the principal
diseases.

15. "The great endemic diseases of India" (we quote from the Report of the Royal Commission). "those which injure the health or destroy the life of the British soldier, are fevers, dysenteries, diseases of the liver, and epidemic cholera, which has for many years engrafted itself on the endemics of the country. Compared with these, all other diseases are of minor extent and importance." The truth of these remarks is illustrated by the following Table,
which

which shows that these diseases, and heat apoplexy, have caused nearly four-fifths of the total mortality in the army in this Presidency for the last five years.

TABLE V.

Y E A R.	Total Deaths from all Causes.	Died from					
		Fevers.	Dysentery.	Diarrhoea.	Heat Apoplexy.	Hepatitis.	Cholera.
1860 - - - -	1,743	237	229	130	125	172	589
1861 - - - -	2,009	178	165	76	60	130	1,065
1862 - - - -	1,153	144	114	39	51	130	413
1863 - - - -	930	117	121	33	45	150	169
1864 - - - -	846	127	67	27	59	119	97
TOTAL Deaths, 1860-1864	6,681	803	696	305	340	701	2,333

16. All these diseases invariably reach their maximum in the hotter months of the year, and throughout the greater part of India the troops are probably as healthy in the cold season as in any country in the world.

Greater prevalence
of disease in the
hot season.

The extent to which the heat of the climate predisposes European constitutions to disease, and aggravates the influence of causes hostile to health, is illustrated by the following Table. The number of deaths from each disease being assumed to be 100, the Table shows the proportion of the whole number occurring in the three coldest months, and in three months of the hot and rainy season. The figures represent the average results of the five years ending with 1863.

The great difference in the mortality during the two seasons will be seen at a glance. It is only in the case of diseases of the respiratory organs that the rates are higher in the cold than in the hot months :—

TABLE VI.

CAUSE OF DEATH.	Died per Cent. of Total Deaths from each Cause.					
	December.	January.	February.	July.	August.	September.
Fevers - - -	3.9	3.3	1.8	10.0	11.7	13.5
Dysentery - - -	5.7	5.4	3.2	8.0	13.8	15.0
Diarrhoea - - -	7.7	5.8	3.1	8.3	14.1	14.4
Heat Apoplexy - -	1.2	.4	1.4	23.3	8.3	6.5
Hepatitis - - -	9.1	6.2	5.9	8.2	10.0	11.2
Cholera - - -	.4	.2	1.1	15.6	47.1	10.2
Respiratory Diseases -	13.0	14.2	9.6	5.0	5.0	6.7
Phthisis Pulmonalis -	8.1	7.2	5.3	10.6	10.6	9.2
Delirium Tremens -	5.9	3.0	1.5	8.9	8.2	14.8

The same facts are illustrated by the following Table, showing the number daily sick, and the number of admissions into hospital, per thousand of strength, from all causes, during the cold and hot months respectively :—*

TABLE VII.

		Rates per Thousand of Average Strength.					
		December.	January.	February.	July.	August.	September.
Daily sick, 1859-63	-	66·6	70·1	70·5	87·9	92·3	92·5
„ 1864	-	48·7	49·9	56·3	69·3	66·9	71·8
Admitted, 1859-63	-	1,412	1,305	1,162	2,075	1,995	1,945
„ 1864	-	1,039	1,001	998	1,384	1,703	1,481

Relation between
meteorological
phenomena and
prevalence of
disease.
Influence of
climate.

17. The nature of the relation between meteorological phenomena in India and the prevalence of disease is a subject which has been little studied, but which possesses great interest and importance. The regularity with which certain diseases invariably recur in an epidemic form at certain seasons is very remarkable. This has been shown very clearly with respect to Calcutta by Dr. Hugh Macpherson.† A summary of the facts has been given in the Report of the Cholera Commission, and we take from it the following account.‡ It is shown that cholera is always present in Calcutta; that it invariably reaches its lowest point every year about August; that it then gradually rises through the autumn and winter, reaches its climax in April, when it causes more than half the total number of deaths, and then again falls regularly until August. The annual rise and fall of small-pox in Calcutta nearly corresponds with that of cholera. On the other hand, when cholera is at its minimum, the number of deaths from dysentery and diarrhoea reaches its maximum. The apparent relation is obvious between the meteorological conditions which characterise the ordinary climate of the year in Calcutta and the variations in the mortality from cholera. When the air is almost at its driest, and the temperature almost at its maximum of heat, before the commencement of the periodical rains, cholera reaches its climax. When the rainy season is at its height, cholera is at its lowest point, and with the diminution and cessation of the rains cholera again increases.

If we compare these facts with those which hold good in the North Western Provinces, we find a most remarkable contrast, although the relation between meteorological phenomena and the disease is marked in an equally striking and interesting manner. In the North Western Provinces, when cholera becomes epidemic, it almost invariably commences with the hot season, it reaches its climax with the maximum of rain in July and August, and then falls gradually until it almost ceases in the winter. The apparent relation between the progress of cholera and the season of the year is as well marked in the North Western Provinces as it is in Calcutta. In the diagrams given in the Report of the Cholera Commission, it is curious to observe how exactly the curves of cholera correspond with those of rainfall, of tension of vapour, of temperature, and of barometric pressure, and how remarkable a contrast they offer to the curves for Calcutta, the disease reaching its maximum in the one case at the very time when it reaches its minimum in the other. “So far as our information extends, this is a branch of inquiry in which literally nothing has been accomplished; nor, indeed, can we find that any serious attempt has hitherto been made in India even to point out its importance. It would be difficult to find a better example of the vast practical interest of those statistics of science, the collection of which has hardly, up to the present time, been commenced.

Although

* See para. 29 and Table XVI., showing the comparative amount of disease among the European and native troops in the hot and cold seasons.

† On the mortality of Calcutta during the 20 years ending 1860.—*Indian Annals of Medical Science*, 1862.

‡ Report, p. 181.

Although we can draw no conclusion regarding the actual nature of the relations that exist between meteorological conditions and cholera, it is evident that those relations are real. When we consider the regularity with which the same phenomena constantly recur, and the excellence of the opportunities which exist for their observation, we cannot doubt that it is within the power of science to solve many problems regarding them, which nothing but our deliberate neglect and ignorance have suffered to remain in mystery.*

The meteorological observations that have hitherto been recorded in this Presidency are most imperfect, and our knowledge of the climate is consequently very incomplete. Our Commission is about to submit to the Government propositions for carrying out systematically the observation and record of meteorological phenomena in India.

Although the importance of the influence exercised by local sanitary conditions, other than those due to mere climate, can hardly be estimated too highly; a fact of which there can be no better proof than the actual diminution that has occurred in the sickness and mortality in the army; there has perhaps been a tendency among sanitary reformers to under-value the importance of the influence produced by climate alone in India on European constitutions. However complete may be our sanitary improvements, and however great may be our success in getting rid of obviously removeable causes of disease, we cannot hope that the mortality among our countrymen in India will ever fall to the rate which prevails in healthy districts in Europe. The Royal Commission stated its belief "that two per cent. (double the rate at home stations since the introduction of sanitary improvements) may be taken as the possible mortality, under improved sanitary conditions," of the troops in India. This expectation has already been fulfilled, and we may reasonably hope for still further improvement. But when the Royal Commission goes on to say that the time may possibly come when "we may cherish the hope of realising what statistical inquiries appear to point to, namely, that the natural death-rate in times of peace of men of the soldiers' ages in India will be no more than 10 per thousand per annum," we fear that the hope is too sanguine.

18. The following Table, taken from Dr. Bryden's Report, gives the means of comparing the rate of mortality from the principal diseases in the European and native army in the Bengal Presidency, with that which prevails in the army in the United Kingdom. These figures illustrate in a forcible manner the importance of purely climatic influences. It will be seen how different is the character of the most fatal diseases of the two countries :—

Importance of climatic influences.

TABLE IX.

D I S E A S E.	Died in Hospital per Thousand of Average Strength.		
	European Army, Bengal Presidency, 1862-64.	Army, United Kingdom, 1859-61.	Native Army, Bengal Presidency, 1862-64.
Cholera - - - - -	5.5	- - - - -	1.9
Small Pox - - - - -	.2	.1	.2
Heat Apoplexy - - - - -	1.2	- - - - -	- - - - -
Apoplexy and Brain Affection - - - - -	- - - - -	.5	.3
Fevers - - - - -	3.1	.6	4.1
Dysentery and Diarrhœa - - - - -	3.2	.1	2.6
Hepatitis - - - - -	3.2	.2	.2
Phthisis Pulmonalis - - - - -	1.9	3.7	.4
Chest Affections - - - - -	1.0	1.5	1.6
Heart Diseases - - - - -	.6	.8	.1
Delirium Tremens - - - - -	.4	.1	- - - - -
Injuries - - - - -	.3	.9	.3
All other Causes - - - - -	2.4	1.3	1.8
All Causes - - - - -	23.1	9.6	13.5

19. The

* Report of Cholera Commission, p. 183.

Mortality among European troops in the several provinces of the Bengal Presidency.

19. The following Table shows the mortality among the European troops from the principal diseases during the last three years in the several Provinces of the Bengal Presidency :—

TABLE X.

YEAR.	PROVINCE, AND AVERAGE STRENGTH.	RATIO PER THOUSAND OF AVERAGE STRENGTH.													
		All Causes.		Cholera.		Fever.		Heat Apoplexy.		Dysentery.		Diarrhoea.		Hepatitis.	
		Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.
1862	Bengal Proper, 2,457 - - -	1494.	26.5	7.	6.1	463.	3.7	2.	2.0	48.	2.4	137.	.4	49.	2.8
"	Dinapore, Benares, and Oudh, 8,951	1516.	14.0	1.	.1	441.	3.4	.2	-	46.	2.1	86.	.1	47.	3.0
"	Cawnpore, Meerut, and Rohilkhund, 9,810.	1842.	22.3	6.	3.7	581.	5.7	2.	1.1	51.	3.0	121.	1.1	75.	4.0
"	Agra and Central India, 5,429 -	2676.	47.5	39.	26.9	1507.	5.5	3.	2.0	54.	3.0	133.	.9	69.	2.8
"	Punjab, 15,930, - - -	2103.	27.8	23.	12.7	972.	3.0	2.	1.4	42.	2.4	125.	1.0	60.	2.5
1862	Bengal Presidency, 42,980 - -	1971.	26.8	16.	9.6	806.	3.3	2.	1.2	49.	2.7	120.	.9	62.	3.0
1863	Bengal Proper, 1,893 - - -	1701.	20.6	5.	3.2	592.	3.2	2.	1.1	100.	4.7	123.	.5	62.	1.1
"	Dinapore, Benares, and Oudh, 8,647	1576.	21.7	11.	7.6	476.	1.4	1.	.6	45.	1.5	96.	.2	60.	4.6
"	Cawnpore, Meerut, and Rohilkhund, 9,209.	1635.	28.8	9.	7.6	462.	2.6	3.	1.3	46.	2.8	105.	1.3	57.	4.5
"	Agra and Central India, 5,493 -	1902.	21.9	6.	3.8	738.	3.6	2.	1.1	60.	3.1	109.	.6	53.	3.6
"	Punjab, 15,660 - - -	2070.	18.1	.1	.1	1076.	3.5	3.	1.3	39.	3.2	81.	.9	71.	2.7
1863	Bengal Presidency, 41,351 - -	1838.	22.5	6.	4.1	739.	2.8	2.	1.1	49.	2.9	96.	.8	64.	3.6
1864	Bengal Proper, 2,002 - - -	1511.	25.0	6.	2.5	423.	5.	2.	.5	40.	3.5	140.	.5	38.	2.5
"	Dinapore, Benares, and Oudh, and Cawnpore, 10,333.	1420.	26.5	9.	6.8	432.	4.	3.	2.4	41.	1.7	123.	.9	47.	2.4
"	Meerut and Rohilkhund, 5,950 -	1688.	17.7	2.	2.	450.	2.5	2.	1.3	34.	1.4	82.	.7	67.	4.
"	Agra and Central India, 4,854 -	1871.	17.3	8.	.6	670.	2.8	2.	1.0	34.	2.5	103.	.6	3.	2.5
"	Punjab, 15,886 - - -	1698.	14.5	.1	.1	720.	1.9	2.	1.0	31.	1.3	75.	.5	62.	2.6
1864	Bengal Presidency, 40,385 - -	1641.	21.0	3.	2.4	542.	3.1	2.	1.5	36.	1.6	9.8	.7	56.	3.0

Gradual diminution of disease among European troops.

20. The gradual diminution of serious disease in the army during the last six years is further illustrated by the following table :—

TABLE XI.

DISEASE.	Died per Thousand of Average Strength.					
	1859.	1860.	1861.	1862.	1863.	1864.
Cholera - - - - -	8.7	12.0	23.7	9.6	4.1	2.4
Fevers - - - - -	6.6	4.9	4.0	3.3	2.8	3.1
Heat Apoplexy - - - -	4.1	2.6	1.3	1.2	1.1	1.5
Delirium Tremens - - -	.7	.8	.5	.4	.5	.4
Dysentery - - - - -	10.2	4.7	3.7	2.7	2.9	1.6
Diarrhoea - - - - -	2.4	1.0	1.7	.9	.8	.7
Hepatitis - - - - -	4.9	3.5	2.9	3.0	3.6	3.0
Phthisis Pulmonalis - -	1.8	1.7	1.9	1.9	2.2	1.6
All Causes - - - - -	44.0	35.6	44.8	26.9	22.5	21.0

21. The returns that are at present available for showing the mortality among officers of the army in India and among women and children are very imperfect. We hope that this deficiency will be supplied in future returns. Rate of mortality among officers of the army.

According to the Report of the Royal Commission, the average annual rate of mortality among officers of the Indian army from 1814 to 1833 was 38 per thousand, and it appears to have been considered that this rate represented, at least approximately, the mortality at the time when the report was published. There can be no doubt, however, that the actual rate has been for many years much lower than 38 per thousand; probably it is not at the present time one-half of this amount. In 1861, according to the Report of the Royal Commission, the rate was 16 per thousand. During the eight years ending with 1853-54 it was 21 per thousand. During the same period the average annual ratio of admissions to strength was 1,323 per thousand. These figures are taken from Dr. Hugh Macpherson's valuable tables.* The same diseases cause the greatest amount of sickness among both officers and men.

22. The average annual rate of mortality among the wives of soldiers in India was estimated by the Royal Commission at 35 per thousand. We fear that for the Bengal Presidency this estimate is too favourable. During the four years ending 1853-54, the average annual rate of mortality among the women of this class was 44·5 per thousand, and the ratio of admissions to strength was 1,268 per thousand.† It is shown by Dr. Bryden's tables in the Appendix, that for the four years ending with 1863 the average rate of mortality among the women was 49·6 per thousand. Rate of mortality among soldiers' wives.

23. The mortality among the children of European soldiers has been still more lamentable; for the four years ending with 1853-54, the average annual rate of mortality was 84·1 per thousand; ‡ for the four years ending 1863, it was 90·4 per thousand.§ Further reference to this excessive mortality has been made in para. 37 of this Report. Rate of mortality among soldiers' children.

24. The following Table shows the comparative mortality among the men, women, and children of the European Army from the principal diseases for the four years ending with 1863 :— Comparative mortality among men, women and children.

TABLE XII.

D I S E A S E.	Died in Hospital, per Thousand of Average Strength.		
	Men.	Women.	Children.
Cholera - - - - -	11·5	17·4	16·4
Small-pox - - - - -	·4	·8	·7
Fevers - - - - -	3·9	5·3	10·7
Dysentery and diarrhœa - - - - -	4·3	9·6	21·7
Diseases of the liver - - - - -	2·8	1·9	·3
Respiratory diseases - - - - -	·9	1·8	3·4
Phthisis pulmonalis - - - - -	1·7	3·8	·3
All Causes - - - - -	30·3	49·6	90·4

25. The returns of mortality and sickness among the native troops may be carefully compared with those for the Europeans. Mortality and sickness among native troops.

According to the Report of the Royal Commission, the average annual rate of mortality among the native troops has been under 20 per thousand.

The

* Analysis of the later Medical Returns of European Troops serving in the Bengal Presidency.

† Dr. H. Macpherson's Tables.

‡ *Ibid.*

§ See Table in Appendix.

The rates of admissions and mortality from all causes among the native troops during the last four years have been as follows :—

TABLE XIII.

Y E A R.	Average Strength.	Ratio per Thousand of Average Strength.				
		Daily Sick.	Admitted.	Died in Hospital.	Died out of Hospital and on Leave.	Died from all Causes.
1861 - - -	39,797	40·1	1,169	16·8	3·5	20·3
1862 - - -	35,922	44·8	1,385	14·0	3·2	17·2
1863 - - -	37,459	46·2	1,477	14·6	5·1	19·7
1864 - - -	37,225	43·0	1,389	12·7	·4	13·1

Sickness and mortality among native troops in the various provinces of the Bengal Presidency.

26. The following table shows the amount of sickness and mortality among the native troops in the several provinces of the Bengal Presidency for the year 1864. It may be compared with the preceding tables, which give similar details for the European troops :—

TABLE XIV.

P R O V I N C E.	Average Strength.	Ratio per Thousand of Average Strength.					
		Daily Sick.	Admitted.	Died in Hospital.	Died out of Hospital.	Died from all Causes.	Died from Cholera.
Bengal Proper - - -	7,929	47·0	1,513	20·3	·5	20·8	6·4
Dinapore, Benares, Oudh, and Cawnpore.	6,945	32·7	975	8·9	·3	9·2	1·2
Meerut and Rohilkbund -	4,388	40·8	1,227	10·5	·7	11·2	—
Agra and Central India -	4,984	43·5	1,230	6·4	·4	6·8	—
Punjab - - - -	10,504	46·5	1,679	11·1	·3	11·4	0·9
Troops on the march, &c. -	—	—	—	—	—	—	—
TOTAL Bengal Presidency	37,225	43·0	1,389	12·7	·4	13·1	1·7

Great difference in amount of disease in different provinces.

27. It is impossible to look at these tables, or, still more, at the detailed returns from which they have been compiled, and which are given in the Appendix to this Report, without observing the great differences in the rates of sickness and mortality in different provinces of India. The remarks that have been made above (para. 4) regarding the caution with which conclusions must be based on arithmetical averages, are peculiarly applicable here. Under the name India, are included many different countries of great extent, varying among themselves in climate, and in all physical conditions as much as the different countries of Europe vary from one another. It is further from Calcutta to Lahore than from London to Naples, and the difference between the two climates is as great in the former case as in the latter. If we strike an average between the rates of mortality in the French Army in Paris, and in Rome, or between the rates in the English Army in London and Malta, the arithmetical result will be of little use as an illustration of the sanitary condition of the troops, and general averages for India have a hardly greater value.

Diseases most fatal to Europeans and natives.

28. It will be seen that the same diseases, with a few exceptions, caused the chief mortality among both Europeans and natives, nor, with these exceptions, were the differences in the rates of mortality very great, but heat apoplexy, delirium tremens, hepatitis, and phthisis pulmonalis, were almost confined to the Europeans. Among them, 6·5 per thousand died from these four diseases, while among the natives, only 0·7 per thousand died from the same causes. These diseases account for the greater part of the difference between the rates of mortality of the two classes of men.

The admissions into hospital on account of fevers and dysentery were more numerous among the natives than among the Europeans. The most striking difference of all is seen in venereal diseases, for which 255 per thousand of Europeans were admitted, and only 49 per thousand of natives.

29. These results are generally in accordance with those observed in former years. The following Table shows the average rates of mortality from the principal diseases among the European soldiers in this Presidency for four years, and among the native soldiers for three years, both periods ending with 1863. The figures in respect of Cholera are not properly comparable, because the period included the great epidemic of 1861, which was so extraordinarily fatal to the European troops at a few stations:—

Comparative mortality among European and native troops.

TABLE XV.

DISEASE.	Died in Hospital per Thousand of Average Strength.	
	Europeans.	Natives.
Cholera - - - - -	11·5	2·8
Shall Pox - - - - -	·4	·3
Fevers - - - - -	3·9	4·1
Dysentery and Diarrhœa - -	4·3	2·9
Diseases of the Liver - - -	2·8	·2
Respiratory Diseases - - -	·9	1·5
Phthisis Pulmonalis - - -	1·7	·5
All Causes - - - - -	30·3	15·2

During the same periods the admissions for venereal diseases were 312 per thousand among Europeans, and 58 per thousand among natives.

30. We have not the means of making a proper comparison between the amount of sickness and mortality at different seasons of the year among the European and native troops respectively. There is, however, reason to believe that the cold season which is so healthy for Europeans is the most fatal to natives.* This appears to be shown also by the returns of sickness and mortality in goals. The result is in accordance with what has been observed in other countries, and is especially interesting as illustrating the importance of purely climatic influences upon different constitutions independently of local sanitary conditions. The following Table gives the means of comparison for the year 1864 only:—

Comparative amount of disease among European and native troops in the hot and cold seasons.

TABLE XVI.

	Ratio per Thousand of Average Strength.					
	December.	January.	February.	July.	August.	September.
Daily sick, Europeans -	48·7	49·9	56·3	63·3	66·9	71·8
Ditto - Natives -	46·2	43·2	41·2	35·3	39·5	50·1
Admitted, Europeans -	104	100	100	138	170	148
Ditto - Natives -	113	93	84	93	132	140
Died, Europeans -	2·4	·9	1·0	2·0	2·0	3·1
Ditto, Natives - -	1·5	1·0	1·2	·7	·9	6

* See paras. 15 and 16, and Tables VI. and VII., showing comparative amount of disease among the European troops in the hot and cold seasons.

Sickness and mor-
tality among
European and
native troops in
1864.

31. The following Table shows the admissions and deaths from the principal diseases during the year 1864 for both European and native troops :—

TABLE XVII.

D I S E A S E.	Ratio per Thousand of Average Strength.			
	Europeans. Average Strength, 40,385.		Natives, Average Strength, 37,225.	
	Admitted.	Died.	Admitted.	Died.
Cholera - - - - -	3	2·4	4	1·7
Small Pox - - - - -	2	·4	1	·3
Fevers - - - - -	542	3·1	693	3·8
Heat Apoplexy - - - - -	2	1·5	3	·1
Delirium Tremens - - - - -	4	·4	·1	—
Dysentery - - - - -	36	1·6	74	1·1
Diarrhœa - - - - -	98	·7	64	1·1
Hepatitis - - - - -	56	3·0	2	·1
Respiratory Diseases - - - - -	80	1·0	37	1·8
Phthisis Pulmonalis - - - - -	8	1·6	·9	·5
Rheumatism - - - - -	84	-	57	—
Venereal Diseases - - - - -	255	-	49	—
Eye Diseases - - - - -	43	-	26	—
All Causes - - - - -	1,641	21·0	1,389	13·1

Probable per-
manency of dimi-
nution of mortality
in the army in
India.
Evasion of epi-
demic disease.

32. It is an important question how far this great diminution of sickness and mortality in the Army in India is likely to be permanent. Believing as we do that this has undoubtedly been brought about by the improvement in the condition of the soldiers, we look forward with confidence to still further progress as the consequence of the constant efforts that are being made. But however much may be done to counteract the unfavourable climatic and other conditions to which Europeans are exposed in India in ordinary times, there are years of epidemic constitution recurring at frequent but undefined intervals, when the best sanitary arrangements within our cantonments are almost powerless. The unfavourable conditions which exist at such seasons will probably ever remain, in a great measure, beyond the power of man to control.

Fortunately, however, even in years of epidemic constitution, the prevalence of disease is often confined within limited areas at a time, and it is on the recognition of this fact that bodies of troops may be preserved from pestilence and death, by promptly moving them away from places which have become affected with the prevalent disease. The utility of this method of evading epidemic sickness has been proved, to the most complete demonstration, in the case of cholera, and it was fully acknowledged by the Government in giving sanction to the recommendations of the Cholera Commission. We believe that the principle is capable of a wider application, and that it may be so extended as to include all the more serious diseases prevailing epidemically and endemically. It is probable that this may be found to be the only simple and practicable means of obviating the recurrence, at short intervals, of years of comparatively high death-rate from extraordinary causes, after good sanitary arrangements have counteracted successfully the ordinary causes of disease. We have noticed in a separate report that this system of evading disease will be greatly facilitated by the extension of railways, and by the provision of military rest-houses at convenient stations along the lines.

Measures for the
prevention of
cholera.

33. Among all the causes which may render us apprehensive regarding the permanency of the improvement that has taken place in the rate of mortality in the army in India, the most important is cholera. If we can guard against the terrible epidemics of this disease which have so often attacked our troops, we need, perhaps, hardly fear that there will be, in time of peace, any serious or continued increase to the rate of mortality which now prevails. But it is visionary to suppose that any amount of ordinary sanitary improvements, such as we are likely to see carried out, will have the effect of preventing the liability to cholera, in a country like this, where the disease is always present, and in
some

some part of which it is almost always virulent. The system of evading disease of which we have just been speaking, has been fully applied in the case of cholera.

One of the most important measures taken during the past year was the promulgation by the Government of the rules proposed by the Commission appointed to inquire into the Cholera Epidemic of 1861, with the object of preventing the spread of cholera among the European troops. These rules prescribe, in great detail, the measures of precaution and prevention which are invariably to be adopted when epidemic cholera is prevalent, or when its attack is apprehended. With a few slight modifications, recommended by the Sanitary Commission for Bengal, the rules have been sanctioned by the Government, and their strict observance has been ordered.

There is no subject connected with the health of the Army in India which is of more essential importance than this, and it is desirable that we should briefly state here the general character of the measures that have been taken. The average mortality in the Army in India from cholera alone, during the last 50 years, has been higher than that which now prevails in the Army in England from all causes put together, and not less than a sixth part of the whole number of deaths during that period has been due to this disease. Very frequently, the prevalence of cholera has been most excessive and most alarming. We have already noticed its terrible virulence in 1861, especially at Meean Meer and Morar. It would be difficult, as the Report of the Cholera Commission truly states, to find a parallel to the mortality at Meean Meer, at least in modern times and among civilized men.

The Cholera Commission arrived at the conclusion that "whenever an excessive mortality from cholera had occurred among the soldiers, it was obviously due to causes which might have been avoided,—either to positive mismanagement, or to the neglect of precautions which it was easy to adopt." "There is a common impression," says the Commission, "that there is something essentially strange and mysterious in all that concerns this disease, and that it is almost hopeless to attempt to lay down any principles of any kind regarding it. There can be no greater mistake. There is, perhaps, no disease which has more strongly marked and invariable characteristics, which regularly present themselves during every epidemic attack, and it is this fact which gives room for hope that means may be found for its prevention. It is only when we come to the purely medical part of the question that we must admit that we at present know almost nothing." The recommendations of the Cholera Commission are founded upon the principle that the observation of facts is the sole basis of physical knowledge, that the facts which characterise an epidemic of cholera are remarkably uniform and obvious, and that in this uniformity of character we have a sound basis for measures for the prevention of the disease.

The rules laid down by the Cholera Commission start with the assumption that no general measures of sanitary improvement, although these, too, are essentially necessary, will alone enable us to contend successfully with cholera, but that special measures are also required, based upon the belief that the cause of cholera is a specific poison, propagated according to certain special laws.

Of all the characteristics of the disease, the most constant and important, so far as our present objects are concerned, is this, that cholera is evidently a disease which attaches itself to particular localities. "Although an epidemic may be diffused over a vast extent of country, the local distribution of the disease is always most partial and unequal. Among a number of places near one another, and apparently placed under altogether similar circumstances, some escape and others are attacked. One part of a town is ravaged by the disease, while other parts are untouched by it. "In a few houses in a street," writes Dr. Baly, "half the inhabitants are carried off by the disease; in the remainder not a single death occurs." * * We have here a rational basis for practical measures for mitigating the violence of an epidemic of cholera. If we find that in some particular place there is evidently present a special cause which is fatal to the persons exposed to it, the obviously reasonable plan is, if possible, to avoid the place altogether. Nor is this only a matter of theory. It has constantly been found in practice that the result of removal, even to a very

short distance from the infected locality, is sufficient to cause the total cessation of the disease.”*

The rules of the Cholera Commission provide, accordingly, for the instant removal of the troops from the place in which cholera has appeared, and for stopping all communication with the infected locality until it may safely be believed that all danger has ceased. It is assumed that cholera is communicable by human intercourse; the Commission, while it avoids the discussion of any theory, evidently leans to the belief that the disease is disseminated by the discharges from cholera patients, and many of the rules are framed to meet this presumed danger. The necessity of carrying out a most vigilant inspection of the men during the prevalence of cholera is strongly insisted upon, with the object of ensuring the discovery and treatment of the disease in its earliest stage. The main object during an epidemic of cholera is the prevention of fresh cases of the disease in its virulent form. Prevention is often possible, but medical treatment has little value after the disease has become fully developed. On all these points, and on many others more or less connected with them, rules have been laid down in great detail. We cannot as yet judge fully of their practical effect, but we have every right to hope that they will gain the end at which they aim. They are, in all essential respects, only a further development of the rules which were laid down in the General Order issued by his Excellency the Commander-in-Chief on the 7th April 1862, and which have undoubtedly proved most successful in checking the progress of the disease among the troops. To watch the operation of these rules, and to learn by experience the points in which they are defective, is now one of the most important duties of medical and sanitary officers in India. The Cholera Commission declared its belief that if proper measures of prevention were adopted, mortality such as that which occurred in 1861 at Meean Meer would be hardly possible in future. We see no reason why this opinion should be considered too sanguine.

Increase of mortality from cholera.

34. Although we hope that the total mortality from cholera may in future be reduced, we fear that there is little room at present for anticipating any greater measure of success in the treatment of the disease. The Report of the Cholera Commission shows that there is, unhappily, great reason for believing that the proportion of deaths from cholera to cases treated has gone on for many years steadily increasing among the European troops in all parts of India. The per-centage rose in Bengal between 1818 and 1854, from 26·7 to 42·0; in Bombay, during the same period, from 18·5 to 43·2; and in Madras, between 1829 and 1851, from 27·1 to 62·3.†

In the Bengal Presidency, since 1854, the per-centage of deaths to cases treated among the European troops has been as follows:—

1854-55	-	-	-	50·5	1860	-	-	-	53·3
1855-56	-	-	-	50·0	1861	-	-	-	64·1
1856-57	-	-	-	53·6	1862	-	-	-	61·3
1858	-	-	-	54·3	1863	-	-	-	75·1
1859	-	-	-	50·2	1864	-	-	-	72·6

The per-centage of deaths to cases of cholera treated has been far greater among the European soldiers than among the Native troops or Native prisoners in gaols. According to the Report of the Cholera Commission, the rate among the Native troops between 1826 and 1861 was generally from about 30 to 40 per cent. In the epidemic of 1861, among all classes of Europeans, the per-centage of deaths to cases was 63·8, while among the Native troops it was 38·2, and among the prisoners in gaols it was 47·9.‡ Since 1861 the rates have been as follows:—

YEAR.	Native Troops.	Prisoners.
1862	50·3	36·4
1863	57·0	36·5
1864	44·0	36·6

We

* Report of Cholera Commission, Section II., para. 431.

† Report of Cholera Commission, p. 249.

‡ Report of Cholera Commission, p. 250.

We can say nothing which would throw any additional light on these lamentable facts. They serve to illustrate strongly the truth of the principle constantly insisted upon by the Cholera Commission, and noticed above, that during an epidemic of cholera among European soldiers, the main object ought always to be the prevention of fresh cases, rather than the medical treatment of those who have been attacked; that medical treatment is ordinarily almost useless after virulent symptoms have appeared; and that the difficulty of affording medical treatment to patients suffering from cholera ought never to be admitted as a reason for omitting to carry out precautionary measures. This last point is one of much practical importance. The disinclination to subdivide hospital establishments during the prevalence of cholera has frequently prevented the proper separation of the troops into different detachments, and has led to the exposure of the men to a positive danger for the sake of giving them an advantage which is for the most part imaginary. So long as it remains true of our regimental hospitals that nearly three-fourths of those attacked by cholera die, medical treatment must be looked upon as a matter of quite secondary importance. There is no reason whatever for supposing that the rate of mortality is higher than this when European medical treatment is altogether wanting.

35. Measures for the prevention of cholera are hardly more necessary than measures for the prevention of venereal diseases. It has been noticed in another part of this Report that Act 22 of 1864 has given power to the Government to make rules and regulations for inspecting and controlling houses of ill-fame in military cantonments, and for preventing the spread of venereal diseases. The Act also provides* that the Governor General in Council, whenever it shall appear necessary for the protection of the health of the troops, may extend to any place outside the limits of any cantonment, and in its vicinity, all or any of the rules or regulations made within the cantonment for the purposes just stated, or may make any additional rules and regulations that are required.

Measures for prevention of venereal diseases.

We have shown, in a separate report, that at least one-third of the whole Army has ordinarily passed through the hospitals in the course of the year on account of these diseases alone. At many stations the proportion has been much higher, amounting to 50, 60, and even 70 per cent. of the force. It may be assumed on any day in the year that a number of men equal to the ordinary effective strength of a regiment are disabled from this cause. Statements such as this give, however, no sufficient representation of the real evil. The highest authorities agree in declaring that these diseases are the origin of a very large proportion of the invaliding which occurs every year, and that the mortality from other diseases is seriously aggravated by them. Dr. Duncan Macpherson, Inspector General of Hospitals, who has made the subject a matter of special study, declares his conviction that "fully two-thirds of those who imbibe the disease are invalided within five years, and are sent out of the service with a loathsome poison circulating in their veins which passes down to their posterity." It is, as this Commission has already declared, little better than folly to talk of measures for improving the health of the Army, and to ignore the existence of causes of disease which every body knows and admits to be more important than almost any others which exist. That preventive measures may be adopted which will have the effect of diminishing to a very great extent these frightful evils, is a fact completely proved by experience both in Europe and in India, and the Government has now the power of dealing effectually with the whole subject. We had hoped that before this time greater progress than we are able actually to report would have been made towards the introduction of an efficient system of prevention. Unforeseen delays have interfered in carrying out the plans which have been recommended, but we confidently hope that during the present year measures will be taken which will produce most important and beneficial results.

The plans that it is proposed to adopt will be in accordance with the recommendations of the Royal Commission, and with the orders of the Secretary of State. It is satisfactory to know that similar measures for the protection of the

the Army and Navy at home were authorised by Parliament in the last Session, by the "Contagious Diseases Prevention Act" (26 & 27 Vict. c. 85).

Diminution in
venereal disease.

36. There has already been some diminution in these diseases, although they are still lamentably common. The following Table shows that they were less prevalent among the European troops during 1864, than in any previous year since the mutinies :—

TABLE XVIII.

Y E A R S.	Average Strength.	Number of Admissions from Venereal Diseases.	Admitted for Venereal Diseases per Thousand of Average Strength.
1858 - - - - -	43,771	11,446	261·1
1859 - - - - -	55,104	19,777	359·0
1860 - - - - -	48,901	16,478	338·0
1861 - - - - -	44,879	16,567	369·1
1862 - - - - -	42,980	13,671	318·1
1863 - - - - -	41,351	11,650	281·7
1864 - - - - -	40,385	10,295	254·9

Measures recom-
mended by Mr.
Acton.

37. As one means of diminishing the liability to this class of diseases, the Royal Commission recommended in its Report that additional measures of cleanliness, such as have been proposed by Mr. Acton, should be provided in barrack lavatories. This recommendation has been carried into effect during the past year. Private bathing-rooms with a supply of water have been already provided in addition to the ordinary means for bathing and washing to the extent of about four per company, and in new buildings this provision will be further increased.

Restrictions upon
marriage. Diffi-
culty of rearing
European children
in India.

38. It has often been said that one great cause of the extreme prevalence of these diseases is the restriction placed upon marriage. This, however, can hardly be the case in India, for the number of married men is, at the present time, less than half of the number authorised under the existing regulations, viz., 12 per cent. On the 1st May 1863, out of 66,748 rank and file in the three Presidencies, only 3,776 were married. This is certainly not the result of any adverse pressure put upon the men. Although the wives and children of soldiers in India have to suffer many hardships, the quarters provided for them are usually much better in India than in England or in the Colonies, and greater efforts have been made by the Government to improve their condition. There can be no doubt that in the Army generally, there is no strong inclination to marriage. It may, we think, be doubted whether this is to be regretted. Putting aside other considerations, which might lead us to the same conclusion, the rate of mortality among soldiers' children in India is so excessively high, that we may well hesitate in coming to the conclusion that marriage in the army is a thing to be generally desired. For the four years ending with 1863, the average annual death rate among the children of the European soldiers in this Presidency was no less than 90 per thousand.* We have no exact statistics to show the age of these children, but we may safely consider that the mortality was, on a very moderate calculation, four or five times greater than among children of similar ages in England. Although this lamentably high rate may doubtless be diminished, we fear that there is little probability that it will fall to anything like a European standard. It is only by the extremest care, and with the help of all the advantages of superior intelligence and wealth, that the children of European parents belonging to the higher classes of society can be reared in the plains of India, and even of these, it is probable that few would reach a healthy maturity if they were not sent at an early age to Europe or to the Hills. "One of the chief impediments," writes Dr. Chevers, one of the highest living authorities upon the subject, "to the colonization of India by Europeans, is the almost absolute impossibility of raising healthy children in the plains.

* See para. 22.

plains. * * So long ago as the year 1835, Dr. Twining, of Calcutta, published the question, 'Does the third generation of the European race exist in India, all the individuals being of pure European descent, and having been born and reared in this country?' This plain question has been known, probably, to every medical man throughout India for nine and twenty years. Many medical officers long engaged with European troops and attached to invalid depôts, have, to our knowledge, been greatly interested in its investigation, but in no single instance has it ever been answered in the affirmative."* Until the Government undertakes (and we must confess that such a supposition seems to us altogether visionary) to send all the children of European soldiers to England or to the Hills, when they reach the age of five or six years, and then to make arrangements for their education and support, it appears, to say the least, very questionable whether marriage in the army ought to be encouraged. It may even be doubted, as Dr. Chevers has shown, notwithstanding the success of those truly admirable and most useful institutions, the Lawrence Asylums in the hills, whether the children of English soldiers can be brought up in full mental and bodily vigour in the climate of any of our Indian sanatoria; and even if this question be decided in the affirmative, it must be remembered that this can only be done at a cost for which, as Dr. Chevers says, gentlemen's children could be brought up, and educated for professions in Europe.†

39. The question of the manner in which the advantages of hill climates can best be extended to the European troops has been the subject of much discussion during the past year, and the Sanitary Commission has submitted to the Government a report containing a full statement of its views upon this important subject. The principal conclusion of the Commission with regard to Himalayan Sanitaria, may properly be stated here; whether hereafter they be in all cases admitted to be correct or not, they will show the points that have to be decided, and the present state of the question. We consider—

1st. That no climates in India have been more completely tested by actual experience than those of the Himalayan Sanitaria; and that their great value to the European troops, if judicious use be made of them, is certain.

2d. That the most suitable elevation above the sea for Himalayan sanatoria for European troops is ordinarily about 6,000 feet above the sea; that no sanatoria should ordinarily be below 5,000 feet, or higher than 7,500 feet above the sea.

3d. That all make-shift arrangements for housing troops in the hills are objectionable, and that good barracks and good sanitary arrangements are as necessary in the hills as in the plains.

4th. That in the practically accessible parts of the Himalaya, in Northern India, elevation above the sea is the only important cause of variation of climate, and that the outer ranges are as suitable for sanatoria as the ranges more distant from the plains.

5th. That it is essential that hill sanatoria should be as near to the plains and as easily accessible as possible; that those parts of the mountains are objectionable which are separated from the inhabited portion of the plains by unusually wide and unhealthy tracts of forest and terai, or by the Siwalik hills and doons; and that the most suitable situations for sanatoria for the troops are those where the higher ranges rise immediately out of the plains.

6th. That in choosing the actual site for sanatoria, no general or necessary connection can be assumed to exist between geological structure and liability to disease; that all sanatoria should possess an ample supply of good water, level ground, sufficiency of wood, and southern aspect; and that the requisite for a good sanatorium can seldom be obtained except in the vicinity of ranges of greater elevation than that which is required for the sanatorium itself.

7th. That it has been proved by experience that the influence of hill climates upon European constitutions is preservative against disease rather than curative; that to obtain the greatest amount of advantage, the men who are sent to the hills should in all cases be selected, in preference to sending whole regiments, and that no general removal of sick men to the hills is proper.

8th. That it must be assumed, on military and political grounds, that no very large

* "Can India be colonized by Europeans?" Re-printed from the "Calcutta Review" for April 1864.

† The cost of the Lawrence Military Asylum at Sunawur, in the Himalaya, containing about 400 boys and girls, was, in the year 1864, nearly 16,000 £, or 40 £. for each child.

large proportion of the army can be placed in the hills; and that the only portion of the army that can be stationed in the hills is that which may be looked upon as a reserve to be drawn upon in emergencies, over and above the force which is ordinarily necessary for the military occupation of the country; that after reducing, as far as possible, the number of unhealthy stations in the plains, a sufficient number of hill stations should be provided, to which such portion of the troops as can be spared from duty in the plains should be sent in rotation, and that all stations in the plains within practicable distance from the hills should have their hill sanitarium, to which a portion of each regiment should be sent.

9th. That for the present it might be assumed that 20 per cent. of the European soldiers may with advantage be stationed in the hills, and that hill sanitarium might be at once formed on this assumption, similar arrangements being also made for the women and children.

10th. That there is no advantage in multiplying the number of sanitarium, but that, as far as possible, they should be concentrated in a few healthy and convenient situations in the vicinity of existing stations.

40. The following figures show the number of men per thousand of average strength invalided during the last seven years. Details showing the causes of invaliding will be found in the Appendix :

YEAR.	Invalided per Thousand.
1858 - - - - -	43·6
1859 - - - - -	33·9*
1860 - - - - -	
1861 - - - - -	28·1
1862 - - - - -	31·5
1863 - - - - -	35·0
1864 - - - - -	36·8

It will be seen that there has been an apparent increase in the rate of invaliding. We are not now able to draw any positive conclusions from these figures. Although the number invalided has increased, it does not follow that the amount of disease has increased also. With the increase of consideration for the soldier, and of anxiety to preserve him against all avoidable causes of disease, there is an increased disinclination to keep him in a climate which is unfavourable to him. The greater facilities for conveying men from the interior to the port of embarkation and thence home have probably had a similar effect.

41. The seventh recommendation made in the Report of the Royal Commission is, "that provision be made for passing invalids at the port of embarkation without delay, and for their immediate shipment home."

Great changes and improvements having been made in respect of this matter since the inquiries of the Royal Commission, we think it desirable to show clearly the practice which now prevails. This is explained in the following memorandum by Dr. C. A. Gordon, one of the members of our Commission, who, from his position as Deputy Inspector General of Hospitals in Calcutta, has had the best opportunities of becoming acquainted with the present system :—

"In the evidence given before the Royal Commission to inquire into the sanitary state of the army in India, it is stated that great laxity of discipline and drinking prevails among troops coming down the river from the Provinces to Calcutta; that the landing of the old soldier at Calcutta, like that of the young recruit, has often been most destructive; that invalids used to land at Fort William, and would come in great numbers into the General Hospital there, with no additional illness than that which was caused by drunkenness; that, as a rule, the decision of the up-country Boards should be final, and that the use of the final Board was not apparent.

"At the time to which the witness examined before the Royal Commission referred, the invalids from the provinces had few of the advantages they have enjoyed of late years.
Formerly

* Average of two years.

Formerly they were brought down country in the native-made boats, these being nightly moored near some village from which it was easy to obtain deleterious liquors, such as the Indian soldier of those days was prone to indulge in; and on their arrival at Fort William they were accommodated in low ill-ventilated casemates, the counterpart of which are now used as store rooms, the very rooms themselves being occupied by the men of a native regiment. With other improvements recently extended to the army in India, however, has come within the last few years a very important one in the arrangements regarding the conveyance of invalids to Calcutta, and in their accommodation while there.

"The native kind of boat has since 1857 been abandoned for the steamer and comfortable troop boat attached to it, the last body of invalids brought down by country boats having arrived at Chinsurah from Gurmucktesur Ghât on 27th February 1857. Still more recently, full advantage has been taken of the railway: arrangements being made at suitable distances along the line for the accommodation and due rest of the men *en route* from the more distant stations. The casemate barracks formerly used have, since August, 1861, been abandoned for the purpose, and the men are now accommodated in an airy and well raised double storied barrack in Fort William, freely exposed to the prevailing winds.

"In 1857 a depôt was established at Allahabad for the purpose of accommodating sick and wounded, and whence they could from time to time be dispatched by steamers and troop boats to Calcutta.* Still more recently, however, rail communication having taken the place of river conveyance, men arriving at Allahabad have been dispatched in that way, arriving at Calcutta in smaller numbers at a time than they formerly did. Accordingly the depôt was broken up in 1864, in accordance with Military Department letter, dated Simla, 28th April 1864, to the Adjutant General, No. 278 E.

"In 1863, orders were issued abolishing the final invaliding committees that had up till then met annually at Calcutta and Mooltan, and in their stead establishing divisional Boards to be presided over by a deputy inspector general, the decision of these being final. G. O. C. C.; 20th August 1863.

"Since these orders were brought into effect, the invalids at Fort William and the stations immediately around Calcutta, namely, Chinsurah, Dum-Dum, Barrackpore, and Berhampore, are brought to Calcutta for this purpose. Those at other stations are brought before local Boards, and are sent to Calcutta with their documents as nearly ready as possible, to await embarkation.

"The results of the new system, as compared with that which it superseded, are apparent from the following comparison:—In the invaliding season of 1862 there were in all 1,388 men brought before the invaliding Board, of which the writer of this memorandum was president, and of these, no fewer than 200 had to be remanded from time to time for further observation before the committee was in a position to dispose finally of their cases. In 1863, on the abolition of the final invaliding committee, the number of men brought before the Board at Calcutta was 111, of whom eight were remanded. It deserves to be mentioned that even this number, comparatively small as it was, was increased by the fact that the 43d Regiment having been ordered to New Zealand, it became necessary to select from it all men who did not appear fit for active service. In 1864 the number brought forward was 71, of whom only two were remanded.

"Invaliding Boards at the different stations are now held as early as possible after September, so that men who are recommended by them to be sent home may, in accordance with general orders, reach Calcutta on or before the 1st of January; and, with a view to prevent troops being sent to Calcutta during the more unhealthy months, strict orders have been issued by the military authorities to the effect that soldiers, whether as transfers or for embarkation to England or the Colonies, are not to be sent to ports of embarkation between the 1st of April and 30th of September, except in special cases.

"A Circular Memorandum from the Quarter Master General, a copy of which is attached to this memorandum, directed such arrangements to be made in 1864 as much facilitated the dispatch of troops from and to the Upper Provinces, and rendered the journey as little harrassing to themselves as was practicable.

"Synthea, the nearest point to Calcutta, at which a camp, such as is ordered in that circular, was formed, is situated at a distance of only 119 miles from Calcutta, so that invalids were readily dispatched from it to Fort William, as detachments vacated the barracks there, and proceeded on their voyage to England. By means of the telegraph, information was readily obtained from Allahabad as well as Synthea, regarding the numbers of men actually at these places respectively, and thus, preliminary arrangements could be made in respect to shipping, the precise numbers to be accommodated being decided on their arrival at Calcutta.

"That the detention of invalids at the port of embarkation is an evil, there can be no question, and that it is especially so at Calcutta is self-evident. Men so detained are there accommodated in a fort, the very nature of which demands that its occupants be healthy and effective men: incentives to crime and opportunities of committing irregularities are abundant; and in the bazaars of the neighbouring city disease of a communicable nature, to which men newly arrived are particularly liable, is ever rife.

"There

* No. 1250, to Assistant Adjutant General H. M.'s Forces, from Deputy Secretary to Government of India, in the Military Department, dated the 30th October 1857, establishing convalescent and depôt hospital at Allahabad.

“ There are some circumstances, however, which, so long as they continue as at present must operate more or less powerfully against the complete removal of the present necessity for detaining men at Calcutta for a short time previous to embarking.

“ A few of the more important of these are enumerated :— Thus, the system has hitherto been that the committee for the purpose of invaliding soldiers for England assemble once a year, namely, as soon as practicable after September. In this way the entire wreck, so to speak, of the previous twelve months, comes to be disposed of within the short period embraced by the cold season. It is true that supplementary committees were assembled in the Presidency and Benares divisions at the end of the cold season of 1864–65, and several men thus sent home, who would otherwise have increased the numbers of those to be brought forward in the succeeding year. Doubtless similar committees will in future be permitted to assemble at the more distant stations between which and Calcutta communication by rail is now easy; but up to the present time the plan here alluded to has not been generally adopted.

“ It is necessary that the accounts of invalids as well as other men be adjusted and settled prior to their being dispatched to England, and that claims raised by them be investigated. Reference to their regiments is thus often necessary, requiring the temporary detention of individuals unless they are willing to leave the adjustment entirely to the officers concerned. Military documents are, it is stated, sometimes received in an incomplete condition; and in all cases the officer in charge of the dépôt has to see that the kit of each man is complete prior to embarkation.

“ Shipping is finally taken up for the precise number of men, their wives and children, borne upon the allotment return sent to the Deputy Quarter Master General by the Commandant of Invalids; it is necessary that the latter allow himself a considerable margin for probable casualties. Thus, it often happens that a man may almost at the last moment prefer a claim that necessitates reference to his regiment; and of course he must be detained in the mean time, unless he be willing to leave its settlement to the officers concerned. A man may die or become too ill to embark, or, as is sometimes the case, he may be placed in confinement for some crime committed, and not be available or in a fit state to embark. In either case the man may have a wife and children of particular ages, so that the precise equivalent of these must be held available for substitution, if necessary, up to the time of embarkation, as payment is made to the owners for the numbers borne upon the return on which the ship has been originally chartered.

“ When practicable, those men who are most seriously ill are dispatched with least delay, when their condition is not so extreme as to render their embarkation inadvisable. As a rule, however, men are put on board ship nearly in the order of their arrival at Calcutta.

“ In accordance with the system still in use of taking up shipping for the troops, the routine adopted in regard to this matter is as nearly as possible the following :—The Quarter Master General's Department having obtained information that a certain number of men are in waiting for transport, the marine authorities invite ‘ Offers to be made by the agents or owners of vessels,’ and the terms being so far arranged for conveyance and feeding, the vessel is surveyed as to her sea-worthiness.

“ The preliminary survey next takes place, during which special arrangements in regard to the convenience of the troops are seen to; namely, ventilation, fittings, means for cooking, and arrangements generally; the officers upon whom this duty falls being one of the Quarter Master General's Department, the principal medical officer at the port, and an officer of the Marine Department who acts as agent for transports. Meantime the Adjutant General's Department publishes the names of officers, military and medical, appointed to take charge of the troops proceeding by the ship.

“ The owners obtain from a contractor provisions and water, and arrangements are made for the precise numbers and designations of persons borne upon the Allotment Return. At the same time the Commissariat and Medical Store Departments, respectively, prepare medical comforts, medicines, and instruments, in accordance with a scale laid down for their guidance.

“ The next proceeding is that the ship's stores are surveyed as to their quality and quantity. The committee appointed for this purpose consists of the officers already mentioned; but, in addition to these, the officers appointed to the military and medical charges respectively are included, a few of the non-commissioned officers and soldiers about to proceed by the vessel being also on board to see the various articles provided for the voyage.

“ The embarkation usually takes place in two or three days after this final survey. The morning is selected for it. Cooks either proceed on board at a very early hour, or, what is still better, are embarked the previous evening, so that the men's breakfast may be served up with the least possible delay; and whenever the state of tide permits, the vessel drops down the river and proceeds on her voyage.

“ Not only does the departure from Calcutta of invalids and time-expired men depend upon the convenience and interest of private shipowners, but with railway communication; as it at present exists, troops are only brought down in small parties at a time, so that several days are sometimes required to enable a number such as is usually put on board one ship to accumulate.

“ In suggesting means for still further facilitating the transport of troops from inland stations to Calcutta, or *vice versâ*, and of the speedy embarkation of invalids for England, is it necessary to assume—

“ 1st. That the line of transports now in progress be established upon the footing of the

the ordinary Admiralty transports provisioned by the Victualling Department, and in fact worked precisely as are those in operation between the United Kingdom and the Colonies.

"2d. That the railway communication with the Provinces be so far improved that large bodies of troops may, without interfering with ordinary traffic, be conveyed as necessary by train.

"These improvements having been effected, the condition of India as regards facilities of transport will have become in a measure similar to that of the United Kingdom, save in the great distances to be travelled in the one country as compared to the other.

"It is necessary that we bear in mind the fact that a very large proportion of men who are included as 'invalids' are not really in such an infirm condition as to be unable to attend to their own wants, or to undergo considerable fatigue. Many are men whose period of service for pension is complete, or nearly so; they are passed by Invaliding Boards as worn out. Others are suffering from the effects of injuries which render them unfit for military duty, but are in no way in infirm health. And others, although debilitated by climate and by endemic disease, are nevertheless capable of undergoing a considerable degree of such fatigue as is likely to attend a railway journey. The conclusion arrived at from experience gained at Calcutta during three consecutive seasons is that the proportion of invalids who arrive at the port in a bedridden or helpless condition is about five per cent. With the exception, therefore, of this proportion, it does not appear that any special arrangements are in reality required for the conveyance to Calcutta of invalids beyond those that already exist for troops in health.

"Men so ill, however, as to be unable to undergo the fatigue of such a journey, ought, I think, to be conveyed in railway carriages specially fitted up for them; and in the arrangement of these some useful hints might doubtless be taken from what has recently been found to answer so well in America, where carriages of this nature were during the war freely used, being fitted up for long journeys, with all the appliances of a perfect hospital. In this country, however, a carriage of this nature fitted for the accommodation of eight or ten bed-ridden patients at a time would alone be required.

"At a port such as Calcutta, where large bodies of troops embark and disembark every year, and where men are often found to be in an unfit condition to continue their journey, the existence of a general hospital becomes a matter of necessity. It is contemplated, therefore, that men arriving from the Provinces in a low state of health would be accommodated and attended to here until fit to embark; but with the provisions already made that men in very advanced stages of disease shall not be sent from their regiments or depôts, the number of sick who would require to be retained would be comparatively small.

"The letter by the Quartermaster General already quoted, details the places at which it has been convenient to establish temporary camps for troops travelling from the Upper Provinces and proceeding to them. These are respectively placed at distances of about six hours' journey from each other, so that, when necessary, detachments may rest at each.

"Were a regular transport to arrive at Calcutta, with reinforcements, these would doubtless be dispatched to the Upper Provinces in detachments, being conveyed direct from the ship to the railway. Under ordinary circumstances, there would be no necessity for any being detained at Calcutta, except those found on medical examination to be in infirm health. These would, as a matter of course, be taken to hospital.

"So with troops coming down from inland stations; were their accounts finally settled prior to their departure for Calcutta, and the completeness of their kit seen to, the necessity which at present exists for their temporary delay at the port of embarkation would altogether cease. They might proceed direct on board the transport as they arrive from the railway terminus; the military and medical staff on board taking charge respectively of them there in the same manner as if they were joining a garrison or invalid battalion on shore, for it seems a matter of necessity that on board the transports there be a military officer permanently appointed to command the troops, and a medical officer to take charge.

"It is evident that a depôt, however, must exist somewhere, so that arrangements be made with regard to troops about to leave India, as well as to provide for the requirements of those arriving in the country; and an important point to be considered is, where such a depôt may most conveniently be formed, having in view the requirements of these two classes.

"Allahabad is no less than 630 miles from Calcutta, or about 36 hours' journey by rail. This circumstance is doubtless a material objection against its being made the starting place for troops about to sail from Calcutta, and a rendezvous for those arriving in the country. Yet, when the central position of this station is considered, and the facilities, which are daily increasing, of rapid communication between it and Central as well as North-Western India taken into account; when, too, it is borne in mind that between it and Calcutta there is really no point that seems to be at all adapted for the purpose, and that retention of troops at the latter is with good cause condemned, there seems to be in reality no alternative left.

"A few words, therefore, in regard to what appears to be the best means of conducting the journey between that station and the transport must conclude this section.

"The halting places along the line of railway, detailed in the Quarter master General's letter given in the Appendix, are for all purposes the most convenient could that be devised. The average period required to pass from one to the other is six, or at the most eight hours.

"The only accommodation that has been provided at these, however, has hitherto been in tents. The Commissariat Department has had an establishment at each for the purpose of supplying provisions to detachments arriving, notice being sent on beforehand of the particular numbers to arrive by specific trains. One of the tents was fitted up as a camp hospital, and a small medical establishment was kept in readiness on the spot, with a view that men taken so ill as not to be able to continue their journey received all attention and requirements. The tents for the troops were provided with bedsteads, but not with bedding, the troops themselves having their own.

"It is considered that, to meet all requirements for the rapid transport of troops now contemplated, little more would be necessary in regard to these halting places than to have one or more buildings erected at each with the usual accessories. Thus, with ordinary organization, every thing necessary for the comfort of the troops would be in readiness for them. Arrangements would be made for the removal of the men from the train to these buildings and for recommencing their journey at the appointed time, while the presence of a suitable medical and hospital establishment at each would in reality add efficiency to economy by rendering it unnecessary to send officers of various grades with small detachments, and by affording all necessary succour and accommodation to the more seriously ill among the troops *en route*.

Page 281, Proceedings for 1864.

"The Sanitary Commission for Bengal has already recommended an alteration in the system of supplying the troops with bedding, by which the necessity will cease for the conveyance from place to place of the large bundles that now are the property of individuals. Instead of these, each man will have his couple of blankets, which can be rolled up in little bulk, and readily available for men during their temporary halts, should the state of the season render this necessary. The bedsteads will be provided with suitable mattresses, and a reserve stock will be with propriety kept on hand to meet possible emergencies.

"Were these arrangements carried into effect, there is every reason to believe that bodies of troops could, under ordinary circumstances, be moved to or from the port of embarkation not only with facility but with absolute comfort to themselves; while, at the same time, the journey for very sick persons would be reduced to its minimum of inconvenience.

"It would be necessary that a steamer with troop boat attached be held available for conveying from the railway station to the transport, or *vice versa*, such bodies, together with their baggage, as may arrive; and it seems to be above all things desirable that there should be at Calcutta an officer specially appointed to superintend and direct disembarkation and embarkation, with reference to the transit from or to the vessel, and the arrangements connected with arrival at or departure from the railway station.

"It is true that there exists sanitary objections against the detention in the river of troops on board freight ships, and that heretofore every exertion has been used to have vessels of this description towed rapidly away to sea. It is not contemplated, however, that similar objections would extend to regularly fitted-up transports, as these would not, it is apprehended, be crowded as are the former, while their ventilation and general arrangements would be far superior."

The recommendations contained in the latter part of the foregoing Memorandum have been lately laid before the Government by our commission, with a separate report, in which the whole question of the transport of troops by railway, and the provision of rest-houses at convenient intervals, has been discussed.

The determination which has lately been taken to establish a line of transports for troops between England and India, and to adopt the overland route instead of that by the Cape of Good Hope, will, it may be anticipated, produce hereafter most important and beneficial results.

These will be felt in many respects, and not the least of the advantages gained will be the means which will be afforded of removing rapidly to England invalids and men who have suffered from the climate of India.

Barrack accommodation in the Bengal Presidency.

42. It is desirable that we should state generally the nature of the barrack accommodation now provided in this Presidency, and the measures that are in progress for its improvement.

The Report of the Royal Commission gives a very unfavourable idea of Indian barracks. It is stated, "the greater proportion of the force is lodged in barracks in such large numbers per room as to be very injurious to health, many of these rooms being several hundreds of feet in length, and some of them containing from a quarter to half of a regiment each!" * * * "The ventilation is generally imperfect; and from the arrangement of doors and windows, men are exposed to hurtful draughts. Many of the rooms are too high, and as a consequence there is much surface overcrowding, both in barracks and hospitals, although with large cubic space. In a number of instances both the space and area per bed are much too small. Barracks and hospitals have frequently no glazed

glazed windows, and only wooden shutters. Both barrack and sick wards often are, as a rule, dark. There are four or even six rows of beds between the opposite doors or windows, increasing greatly the already existing difficulty of ventilation and exposing the inmates to foul air."

The evidence upon which these and many other unfavourable conclusions were based, was given either by officers who had only seen this country at a time when sanitary improvements had been little thought of either in India or at home, or who spoke of the state of things existing immediately after the mutinies of 1857-58, when the country had just passed through one of the greatest convulsions recorded in history. A great European army was suddenly thrown into India with no previous warning, and under circumstances which often made it impossible to give proper consideration to the question of how the necessary accommodation could best be furnished. Barracks and hospitals and other military buildings had suddenly to be provided in the least possible time, with most imperfect means either of obtaining good designs, or of supervising the execution of the works that were undertaken.

The determination of the numerous questions connected with the permanent distribution of the Army was a work of time and of difficulty. It is only during the past year that a decision has been arrived at regarding the manner in which the troops are to be distributed at the various stations in this Presidency. So far as was practicable, the number of men at unhealthy places has been diminished. Some stations must necessarily, for military reasons, be retained, at which, in spite of all precautions, we must expect a considerable amount of sickness; but such places are not numerous, and the bulk of the army will be situated at stations which there is every cause for hoping will prove healthy. So long as these questions remain pending, it was difficult to make final arrangements for supplying the permanent barracks and other military buildings that are required, and the troops have necessarily, up to the present time, been, to a considerable extent, lodged in the barracks that were built in the years immediately following the mutinies.

Imperfect as these often are, there has been constant improvement going on. For several years past there can be no doubt that matters have been far more satisfactory in this respect than the Royal Commission supposed, and their conclusions are little applicable to the present state of things. "The existing buildings are, for the most part, altogether inferior to those which, under the arrangements which we are about to notice, will take their place, but in spite of all their faults, we believe that it is true, even at the present time, that there is no country in which the troops are, upon the whole, housed so well as they already are on this side of India.

We think it desirable to quote *in extenso* the following Despatch from the Government of India to the Secretary of State, written in July 1859. It gives a clear account of the measures taken, under circumstances of great difficulty, to provide proper accommodation for the troops, and shows the great interest which for many years past has been taken by the Government of India in improving the condition of the soldier. It must be observed that this Despatch was written two months after the Royal Commission was first appointed, and before it commenced its inquiries, and that its report was not issued until four years later :—

DESPATCH from the Government of India, Public Works Department, to the Right Honourable Lord Stanley, Secretary of State for India (No. 17—Military); dated 28 July 1859.

We propose in this Despatch to lay before your Lordship some authentic details as to the quality of accommodation which has of late years been provided for the European troops serving in India, especially in the territories under our more immediate supervision, that is, in Bengal, the North-Western Provinces, Oudh, and the Punjab.

2. We are the more desirous to do this, because we believe there is no correct apprehension in England of what has been accomplished in this respect. In the evidence of Mr. J. Ranald Martin before the Royal Commission on the re-organisation of the army, that gentleman states, "that he never saw a good barrack in India, though one in Sindh, erected by Sir Charles Napier, is said to be very fine." Though both the force of the general statement and that of the exception are afterwards somewhat qualified, the weight of Mr. Martin's reputation, and this general statement of his experience, are likely to

convey a wrong impression where it is not known how much has been done since that gentleman's Indian experience terminated.*

3. Some of the older barracks, such as those at Berhampore and Dinapore, erected in the last century, are handsome buildings and must have cost considerable sums,† but they are built in squares, which is a bad arrangement where so much of health and comfort depends on free access of wind, and they are in other respects defective. They were also, we have reason to believe, often over-crowded. The late Colonel Otter, of Her Majesty's 61st Regiment, told our secretary in this Department that, when he was quartered at Berhampore, 30 years ago, two battalions, mustering some 1,400 men, were lodged in these double-storied blocks, to which we have assigned, after the addition of verandahs and other material improvements, in the arrangements now in progress, only 600 men.

4. The era from which we may date a decided advance in barrack arrangements was the foundation of the Umballa cantonment by Lord Ellenborough in 1843-45, on the abandonment of Kurnal.

The infantry barracks at Umballa were intended only to be temporary. As is (naturally) often the case, they were made to serve their purpose too long, and it became necessary to condemn them. They have lately been almost re-constructed, and will now afford excellent quarters.

5. But the cavalry barracks, built for Her Majesty's 3d Dragoons, by Captain (now Sir Robert) Napier, were in substantial little inferior to anything since built. In them ridge ventilation was introduced, perhaps for the first time. These barracks have always held a high place as healthy and commodious buildings.

6. The erection of the Meerut barracks for two regiments of infantry, in 1845-46, was another step in the right direction. There are four of these to a company, and they have always been healthy. We believe the sub-division of troops in barracks to be a point hitherto too little regarded, and that, with smaller bodies under one roof, we should have nearer approach to the standard of health in private houses.

7. Improvement of a decided character had, therefore, begun some time before Sir Charles Napier took up the subject. But his strong representations were doubtless most effective in fixing the high standard which was aimed at in the barracks, commenced or projected during his command, at Meean Meer, Sealkote, Rawul Pindee, and Peshawur. This scale again became practically the standard wherever new barracks had to be built or old barracks to be remodelled. The two-storied barracks at Cawnpore, the progress of which was interrupted by the revolt, but which are now going on again, are designed on this scale; the new barracks at Agra (truly splendid buildings as regards their purpose) have been built on it, as have also the Artillery barracks at Umballa, and the Sapper barracks at Roorkee; the dragoon barracks at Meerut have been remodelled on the same scale; the new barracks at Trimulghery, in the Deccan, are rather an exaggeration of it; and in 1857, when it was considered desirable to prepare standard plans of all military buildings, the Punjab scale was taken as the basis of the plan issued.

8. In the Punjab cantonments, the hospitals, and other subsidiary buildings, have also been designed on a scale equally ample with that of the barracks.

9. The plan of the two barracks at Kussowlee for 250 men each, built in 1855-56, was a modification of the same ample scale of accommodation to suit the Hill climate. Unhappily they have lately been burned.

10. The two great blocks of three-storied barracks lately completed in Fort William are necessarily peculiar in shape and disposition. But they are on no inferior scale of space, and are highly appreciated by officers and men.

11. The Chinsurah barracks are now undergoing alterations to bring them nearer the same standard.

12. All the older barracks in Fort William have also been materially improved of late years, with one exception, viz., the Royal barrack (for officers). The chief defects of this may be remedied without much difficulty, and orders have lately been issued for the necessary changes.

13. In November 1857, to meet the demand for new permanent barracks, which was lately to arise, the Government of India ordered from England complete sets of wrought-iron girders, joists, and roof-trusses for five complete sets of double-storied barracks on the standard scale. The pressure for buildings of more ready construction has prevented our yet making use of these.

14. For, when troops poured into India, in 1857, it was manifest that there was no time for such elaborate structures. It was necessary to provide for immediate wants as quickly as possible. It could not even be determined where garrisons would be most required when the tide of insurrection should have receded, and many places in which they would certainly be wanted (the whole province of Oudh, for instance) were still unrecovered. All that could be done was to occupy such points, untouched by insurrection, or recovered from

* In a well-known professional periodical, "The Builder," of 27th March 1853, also appears the following paragraph:—

"The greatest ignorance of sanitary requirements appears to prevail in India, and the condition of the barracks is frightful. This the Government have known for years, but frightful it still remains."

In an after Number, Mr. Martin's evidence is quoted in support of this statement.

† The barracks at Dinapore appear to have been built about 1790-94, and the three two-storied barracks at Berhampore about the same time. The latter, from a bill in the "Military Board Records," September 1794, appear to have cost about 34,000*l*.

from it, as military considerations, sanitary repute, facilities for construction, or aid from existing buildings, recommended to the selection of Government.

15. In Bengal, the points selected were Dum-Dum, Barrackpore, Hazareebagh, Rancee-gunge, Dinapore, Darjeeling (as the temporary post of a detachment, perhaps to become permanent), Dacca, and, more lately, Dehree, on the Soane Ferry, and Dorunda, in the Chota Nagpore territory.

16. The plan generally adopted in Bengal for these new structures will be found in Figure 37.

17. The difficulty of rapid construction in India generally arises, not merely from the time required to collect large bodies of artisans, but from the impossibility of suddenly establishing an extensive brick manufacture.* In building against time our officers had therefore to dispense as much as possible with the use of burnt brick. The foundations used were of this material, with a superstructure of brick pillars only, the intervals being filled up with walls of kutchra or sun-dried brick; additional security was given by frequent cross walls.

18. The Court of Directors, in connection with the dispatch of reinforcements, announced their having ordered skeleton frames of iron to facilitate the preparation of cover calculated to provide for 10,000 men; three-fifths of these were sent to Calcutta and the remainder to Kurrachee for use in the Punjab. These frames began to arrive in March 1858, and have been of the greatest service in completing accommodation at Dum-Dum, Barrackpore, and Rancee-gunge. They are also now being used in construction at Dorunda and Dehree.

19. In the Punjab they have already been not less serviceable at Mooltan. And they are about to be used in the completion of barracks of a more permanent kind at Ferozepore and Meean Meer. The scarcity of timber has rendered this advisable.

20. The drawings (Figures 17 to 21) show the various ways in which these frames have been, or are being applied.

21. Their great defect is the want of height in the side stanchions. This is less felt where a verandah is cut off from the interior space, as at Barrackpore. But where, as in the plan sent out from England, the whole interior is converted into a barrack ward, and the verandah is consequently an extraneous addition, the lowness of the latter is complained of by the medical men.

22. The plan (Figure 37), already referred to, was not at first ready for issue in the Upper Provinces, but general instructions, quoted in the margin,† were given to the then Government of the Central Provinces.

23. The sketches (Figures 22, 24, 25, 26) show the temporary barracks erected in the early part of 1858 at Benares and Allahabad.

24. The new barracks at Benares are excellent, and have given general satisfaction. It was, however, impossible to provide at once all that was required *de novo*. The buildings of a central lunatic asylum at Benares, which had been in progress before the mutinies, were also taken possession of, and altered to suit them as far as possible for barracks. They are defective in some points.

25. At Allahabad a great task was thrown on the engineer. He had to provide for upwards of 4,000 men, besides providing largely for officers, who, in India, have hitherto found their own accommodation. Captain Impey showed extraordinary energy, and accomplished a great feat in providing the required cover in little more than six months. But this pressure almost inevitably led to defects. No exertions could provide all the material that was required. The orders were not strictly observed, and in many of the barracks the floor is barely raised above the general level of the ground.

26. At Roorkee and at Futtighur, barracks were erected of the pattern shown in Figure 27. They are airy and comfortable.

27. At Muttra, somewhat similar barracks were built. Part of the accommodation required there was, however, given by the adaptation of existing cavalry stables. These are now being replaced by proper barracks.

28. In Rohilkund, generally, the accommodation has hitherto been more or less of a make-shift character. So far as large buildings, cutcheries, and the like could be turned to account, it is unexceptionable. But a large addition had to be made of temporary ranges. These are all well ventilated and sufficient in superficial area, but the walls are generally of insufficient substance, either wattle and dab, or thin brick work.

29. In judging of these and similar structures, the circumstances must be considered. They

* It is to be remembered that in no part of Gangetic India, except in a few of the largest cities, is any considerable proportion of the dwellings of the people built of brick or stone. Bamboo and mats in Bengal, mud in all the Upper Provinces, are the ordinary materials of construction.

† Extract of letter from D. P. W. to Secretary to Government, Central Provinces, No. 5572 of 20th November 1857:—

“It is suggested that a safe and suitable construction for the temporary barracks might consist in the erection of substantial piers of brick laid in lime mortar for the support of the roof trusses or principal rafters. The intermediate spaces being afterwards filled with walling of sunburnt brick; safe provision, however, for the use of wet tatties being made on the western side of the buildings. But the Government would desire to leave to the superintending engineer a large discretion as to the style of building which he may judge may be most rapidly completed at each locality, provided the construction be secure and the cover sufficient. The accommodation afforded should not, however, be beneath the scale indicated by a ward of 18 feet in clear breadth, with a verandah of 10 or 12 feet wide on each side, that on one side being closed and that on the other open, the whole raised at least three feet from the ground. And the superficial area per man, exclusive of the verandahs, should not be less than 60 feet.

They were the best that could be given at the time, and were immeasurably preferable to the only alternative, that of continuance under canvas.

30. We may here observe that, on the Grand Trunk Road, barrack ranges were erected at proper intervals at rest-houses for the accommodation of detachments proceeding by bullock train. These are shown in Figure 30. They have sometimes been the subject of unfavourable criticism by the passers-by, who were not aware of the limited purpose which they were intended to serve; but we have not heard of their being complained of by the troops. They appear to us (and the Governor General has seen nearly all of them) to be in the main good and fit for their purpose, viz., that of giving shelter during the heat of the day. Some huts of an inferior character that were run up hastily at Raneegunge and elsewhere have been gradually improved or replaced by better structures. In the North West Provinces and Punjab, where the mid-day heat is more severe, barracks of a superior kind, with glazed doors, are now being erected as rest-houses.

31. At Gwalior, after its recapture in June 1858, the lateness of the season and the almost total deficiency in timber necessitated the use of hut barracks of small pretensions. These have this year been almost entirely remodelled, and some considerable progress has also been made with barracks on the scale shown in Figure 35, or of similar calibre.

32. At Jhansi, barracks on that scale are in progress, but the progress has been slow, owing to the more than usually scanty supply of labour in that part of the country. In the meantime all that could be done has been done to adapt existing buildings to the comfortable accommodation of the troops.

33. At Ooraie, where it has lately been necessary to establish a wing of infantry since Calpee proved unhealthy, barracks for a detachment of that strength are well advanced.

34. At Banda means were sadly deficient. Existing buildings were adapted, as well as the circumstances admitted, but Lord Clyde has pronounced against the retention of this as a European station. At Saugor, the accommodation was largely derived from the adaptation of existing buildings supplemented by the erection of several barracks. At Jubbulpore, barracks for a regiment were built, which are well spoken of, but of these no drawings are at present available.

35. At Kamptee, good temporary barracks of a substantial kind have been erected for four squadrons of dragoons, and orders have been given for the improvement of the old infantry barracks.

36. In the Punjab, at Rawul Pindee, barracks for artillery and for an additional regiment of infantry, on the plan formerly used at that station, are in rapid progress.

37. At Cambelpore, on this side Attock, good and substantial temporary barracks for half a regiment, highly spoken of by Major General Sir Sidney Cotton, have been erected.

38. Our present object, however, is not to summarise the progress made in barrack building all over the country, but to show the calibre of accommodation that has been or is being provided.

39. At Delhi all the accommodation was derived from the adaptation of existing buildings. The halls of the palace were converted into comfortable quarters for half a regiment. But though the occupation of the palace was inevitable, the mass of buildings existing within was a serious drawback.

40. At Lucknow, necessarily, the mass of troops was placed in existing buildings as late as the beginning of June 1858; a considerable force was ordered to be huddled at Muriaow (the old Lucknow cantonment), and at Nawabgunge on the road to Fyzabad. At such a time nothing but the most hasty construction was possible, and the huts could only be looked on as a few degrees better than canvas.

41. Before the working season of 1858-59, it became necessary to consider what calibre of accommodation of a more permanent kind should be provided in the recovered provinces, especially Oudh and Rohilkund. To follow the standard plan would have been to say that the troops were to remain for years with cover of a make-shift character. And the expense of building simultaneously a great number of cantonments on the scale of Meean Meer, or Trimulgherry, would have been enormous, even if time had been of little moment. Indeed, the difficulty found in carrying out rapidly even the more moderate scale of building adopted shows that the achievement would have been impossible.

42. Beyond a certain limit, it is not the indefinite increase of height or space in barracks that is required to improve the health of the soldier. It is not even in the first degree the improvement of drainage and barrack offices, essential as these are, but the right internal economy of the regiment, the reformation of the habits of the men, and the provision of healthy employments as well as of amusement.

43. The plan adopted for barracks in Oudh and Rohilkund, and which is being followed also at Jhansi and several other stations, was approved by Lord Clyde and by Sir William Mansfield, and is shown in Figure 35. It dispenses with the inner verandah of the Punjab plan, a construction regarding the advantages of which opinions differ greatly. But it affords what that plan scarcely does, a separate apartment for meals and occupation in the day time. Good open verandahs all round, clerestory windows, and wide eaves, are additional points worthy of notice. The barracks are for half companies; the wards, separated by the dining hall, for quarter companies. And thus the sub-division to which we have before alluded is obtained.

44. Barracks on this plan are now in progress at Lucknow (Dilkoosha) and at five other stations in Oudh. As yet they have not made much progress except at Lucknow. Bricklayers were very scarce in the districts; the times have been very unfavourable to the

the voluntary migration of artisans; and the demand all over the country simultaneously, not only for barracks, but for railway works, has as yet rendered all attempts to increase their numbers materially very unsuccessful. In the meantime available labour of this kind has been chiefly concentrated on buildings to serve as hospitals, whilst huts of a superior character have been erected for all the troops. A sketch of these is given in Figure 36.

45. Including these statements, we may be permitted to observe that of late years it is seldom indeed that a proposition made to our Government for the addition of any improvement or comfort to the accommodation of the British soldier has met with a negative. The scale on which every description of barrack building was planned, and was being executed in Lord Dalhousie's time,* and up to the outbreak, was one which, if it erred, erred on the side of over-liberality. And this liberality was not confined to barracks, but extended to hospitals, quarters for married men, and all out-offices, regimental prisons, schools, canteens, and workshops had been authorised on a similar scale when the mutiny broke out. (*See accompanying lithographed standard plans.*)

46. As regards the later efforts of our Government and of our servants in the Department during the last two years, we do not pretend to deny that there have been mistakes, and that some disappointment has too often followed sanguine expectations. But if just consideration be given to the state of the country under which these works have been commenced and carried on, to the circumstance that the great sources of timber supply were for a long time absolutely shut up, to the inadequacy of the Department even in its full previous strength to meet so sudden and vast a tax, to the fact that many of our best and ablest departmental officers were engaged in the field, and not a few lost to us altogether, to the consequent necessity of transferring officers from province to province, according to the degree of pressure, a measure attended with disadvantage to the works, with injury to the organization of the Department, and with an excess of strain on many of those concerned, which ere long will further tell on our available strength, and to the great competition for the limited supplies of material and skilled labour which still continues, we trust that what has been done may meet with a fair judgment. A great deal, it must be acknowledged, still remains to be done, notwithstanding that since the outbreak of the mutinies in May 1857, barrack accommodation (not counting huts or other inferior temporary barrack adaptations, restorations, or barracks for married men) has been completed, or is in active progress, for not less than 40,000 English soldiers, within the provinces we have spoken of.

42A. There are now very few barracks in the Bengal Presidency which answer to the description contained in the extract which has been given above (paragraph 41) from the Report of the Royal Commission. At three or four old stations in Bengal Proper, occupied by small bodies of men, there are barracks of great size. The Dalhousie barrack in Fort William, which was built only a few years ago, is intended to hold an entire regiment, and has six rows of beds between opposite windows, but we believe that in no other case for many years past has any barrack been built to hold more than a single company. Since 1857 few barracks have been built for more than half this number, and they have been generally constructed on thoroughly good principles. The half-company barracks divided by a dining hall in the centre (referred to in paragraph 43 of the foregoing despatch), which were built by Colonel Crommelin in Oudh and elsewhere before any attention was called to the subject in England, and five or six years before the publication of the Report of the Royal Commission, are, in all essential respects, identical in design with the best single-storied barracks that have since been erected or recommended either in England or in India. In a memorandum written by Colonel Yule in February 1862, when he made over charge of the Department of Public Works to his successor, he wrote as follows:—"An earnest endeavour has been made in most of the new barracks erected under the Government, of late years, to introduce a greater sub-division of accommodation than had formerly been usual for barracks. Formerly barracks were almost always made for one company, or 100 men. I have long thought this system of accommodating 100 men in one great apartment, even when the amount of cubic air per man was more than ample, an objectionable and injurious one, and one of the causes which keeps the average health of British soldiers in India low. The experience of Europe is, I believe, the same, whilst our own experience of the results of hutting men in small parties is very favourable. The barracks built in Oudh, Rohilkund, Gwalior, Dehree, and lately at Hyderabad, have been for

Improvement of
Barrack accommoda-
tion.

* The differences which arose between Lord Dalhousie and Sir Charles Napier had apparently led some to believe that because the latter was an ardent supporter of all that tended to the soldier's comfort, the former must have been cold in the matter. Nothing could be more untrue.

for half companies, divided in two by a spacious dining-hall, so that practically they may be considered almost as quarter company barracks. Double verandahs have been dispensed with."

The existing barracks for a whole company are mostly divided into three or more rooms, but the separation of the rooms is usually imperfect, and when, as is very often the case, there are double verandahs to the barrack, it is hardly possible to keep the air in a proper state of purity at all seasons. All that can be done, until these barracks are superseded by others of better construction, is to take care that abundant space is given to the men, and that ample ridge and other ventilation is afforded. This, we believe, has been already done in every case.

Glazed windows in barracks.

43. The statement made in the Report of the Royal Commission, that "Barracks and hospitals have frequently no glazed windows, and only wooden shutters," certainly does not apply to this Presidency. So far as we have been able to discover, there is not a single barrack or hospital of which this is true, or of which it has been true for many years past. The statement that "both barrack and sick wards are, as a rule, dark," is perhaps true of the buildings with double verandahs, but of no others. Whether, however, this is a disadvantage is doubtful, although, upon other grounds, we strongly object to buildings of this construction. Almost every body who has lived in the upper provinces of this Presidency during the hot weather knows that excess of light and excess of heat almost necessarily go together, and that, however theoretically objectionable, exclusion of light is essential to comfort. Unfortunately, it is not always easy to exclude light without interfering with ventilation.

Principles on which barracks are in future to be constructed.

44. After full consideration of the subject, and after consulting the most competent authorities, the general rules and principles have been laid down by the Government, according to which all barracks for European soldiers are in future to be invariably constructed. From these fundamental rules, there can in no case be any departure, and specimen plans, suitable for different localities in the plains and in the hills, have been prepared. The following are the principal rules that have been laid down regarding the construction of barracks for unmarried soldiers.

Under ordinary circumstances, no barrack for infantry will be built to hold more than half a company. Barracks for whole companies will only be considered admissible in special cases, as, for example, in a fort. For cavalry, each barrack will hold a troop. For a light field battery of artillery there will be three barracks, one for each division. The number of men provided for under one roof will be, in the case of the infantry, 40; in that of the artillery, 44; and in that of the cavalry, 60. The barracks will contain sleeping rooms capable of holding from 16 to 22 men in each. The latter number will in no instance be exceeded. The rooms will in all cases be entirely separate, having no direct communication with each other. Double-storied barracks will, as a rule, be adopted in all parts of India, the upper floor being alone used as dormitories, and the lower floor being occupied for day-rooms and other purposes. About one-half of the space in the lower floor will usually consist of day-rooms for the men, one-fourth will be an open arcade for exercise and amusement, and the remainder will be used for auxiliary purposes, such as store-room, sergeants' mess, regimental library, recreation-room, &c. All out-offices, such as cook-rooms, lavatories, latrines, &c., will be provided in separate buildings. The minimum space allowed in the sleeping rooms in the plains will be as follows:— $7\frac{1}{2}$ running feet of wall space per man; 90 superficial feet per man; width of ward, 24 feet; height of wards in both floors to wall plate, 20 feet; this will give 1,800 cubic feet per man. In stations in the hills, the space allowed will be somewhat less, but the allowance will never be less than 77 superficial feet and 1,232 cubic feet per man. There will be only two rows of beds in a room, between opposite windows; not more than two beds will be allowed in the wall space between two contiguous doors; and no bed will be placed within nine inches of a door. There will be a single verandah, 12 feet wide, all round the barrack. Quarters for two sergeants will be provided in each half-company barrack. Each sergeant's quarters will be on the scale authorized for married men. Separate married quarters will be provided for the rest of the non-commissioned regimental staff. The principles have also been laid down according to which barracks for married soldiers are

to

to be constructed. Each family will be allowed two rooms, one measuring 16 feet by 14, and one 14 feet by 10. The quarters will, as a general rule, be grouped in blocks to suit the wants of troops and companies; each block for a troop of cavalry or battery of artillery will ordinarily contain eight quarters, and each block for a company of infantry will contain 10 quarters. There will be an open verandah on both sides of each block. The quarters of each family will be entirely separated from each other by division walls running up to the roof. As a general rule, single-storied buildings, well raised above the ground, will be adopted, but double-storied buildings will be constructed when they are shown to be more suitable in any particular case. Covered passages will be built to connect the barracks and out-offices, and latrines and bathing rooms will be provided for men and women in entirely distinct buildings.

The resolution of the Government of India* in which the foregoing rules have been embodied, has been sent to the Home Government for approval. In all respects of importance they coincide with the views expressed by the Royal Commission and by the Barrack and Hospital Improvement Commission, and there can be no doubt that if any modifications be hereafter ordered, they will not affect the general principles that have been laid down.

45. It has been noticed above that the lower storeys of the new barracks will contain the day rooms and other auxiliary accommodation. It is desirable that we should state in some detail the nature of the arrangements which the Government proposes to carry out.

Day and recreation rooms, and other accommodation.

In each half-company barrack, the portion of the lower floor devoted to day-rooms will be divided into three compartments. There will be a general mess-room for the barrack, and two other rooms, one for each sub-division of the half-company. It is considered desirable to separate the recreation rooms from the mess-rooms, so that the occupants of the former may not be inconvenienced by flies, by preparation for meals, &c.; and the sub-division of the recreation-rooms has been thought desirable, with the object of affording to the men places more quiet and private than they could otherwise obtain. These rooms will be furnished with tables and short benches, and in the Upper Provinces with fire-places. In addition to these rooms, there will be for each regiment large general recreation and refreshment rooms, with separate reading room and library; and for at least eight out of the 10 companies there will be open arcades in the lower story of the barracks, which will furnish places for drill, exercise, and amusement, and will remove much of the temptation to the men to wander out in the sun when weary of the barrack-rooms. The reading rooms will be furnished with presses for the books supplied by the Government, and for the regimental library. The question of the supply of books by the Government is to be considered separately. Some of the regimental workshops will also be provided for in the lower storeys of the barracks; but for carpenters' shops and other noisy trades, separate building will be provided. The canteen will also be in a separate building.†

In addition to the means of employment and recreation that have been above noticed, it is proposed to provide for each British regiment the following: (1), a double fives court for each wing of the regiment, on an improved plan, one court for each wing to have a back wall to admit of its being used for racket-playing; (2), a double skittle alley for each wing, one of each to be of sufficient length to allow of the American bowl game; (3), a gymnasium according to the English standard plan as far as practicable; (4), a swimming bath for each wing for the men, and another, if this should be proved to be desirable, for their families, to be raised above the level of the ground to admit of complete natural drainage; (5), a cricket ground, to be railed in and turfed by Government; (6), a sergeants' mess, with reading and recreation rooms in a central position, convenient to the staff sergeants' quarters, or, in the case of batteries of artillery, or other small bodies of men, under the same room as the staff sergeants' quarters; (7), a womens' day-room for each wing of the regiment. The expediency of ultimately providing a theatre, for theatrical performances and for lectures has also been recognised, but it was considered that this should only

* Public Works Department, Circular No. 89, dated 16th December 1864.

† Resolution, Government of India, Public Works Department, No. 1M-2, dated 3d January 1865.

only be done when provision had been made for the other more pressing requirements of the troops.*

Provision of quarters for married men.

46. It has been noticed elsewhere (para. 37) that the number of married men is at present much below that which is allowed by the regulations of the army. Considering that the number will probably increase, and that it is desirable that accommodation should be ready whenever it is required for the wives and children of the soldiers, it has been determined by the Government that married quarters should at once be furnished for 12 per cent. of the rank and file and drummers.† The nature of the accommodation provided for married soldiers has already been described (para. 44.)

Principles of hospital construction.

47. The principles upon which hospitals for the European troops in India should be constructed have been considered during the past year, and standard plans have been prepared. The same course will probably be adopted that has been taken in respect of barracks. Certain fixed rules will be laid down, which will be obligatory on all occasions in which new hospitals are required. The chief of the proposed rules are as follows :

All regimental and detachment hospitals will be double-storied buildings. The whole of the wards for the sick, together with a certain amount of necessary subsidiary accommodation, will be arranged in the upper floors, and the day-rooms, quarters for the medical subordinates, administrative offices, store-rooms, &c. will be provided in the lower floors. Unless, under exceptional circumstances, when there may be a want of sufficient building space, no hospital will be built with more than two storeys of sick wards.

The maximum number of sick in one building will be 60, but these will not be under one continuous roof, each building being divided into two sections, and each having, as nearly as possible, an independent ventilation. The hospital for a regiment of infantry will consist of two such buildings for the men, and one building for the women and children. For a regiment of cavalry, there will be one building for the men, and one for the women and children, and one building will serve for two batteries of artillery. In each hospital there will be separate wards for the sick and for convalescents. Ward offices, day-rooms for sick and convalescents, quarters for medical subordinates, for hospital sergeants and orderlies, and the necessary store-rooms, surgery, kitchens, bath-rooms, privies, &c.; many of these requirements will be provided for in detached buildings.

The maximum number of beds in any ward will be 32. The beds will be arranged on the opposite sides of the room between the doors; there will not be more than two beds between the opposite doors of the ward, and not more than one or two beds between two doors, or between a window and door on the same side of the ward. The ordinary width of a ward will be 26 feet, and the height 21 feet; each bed will have 10 feet of wall space, 130 square feet, and 2,730 cubic feet. These plans are, in all essential respects, exactly similar to those that have been recommended by the Royal Commission, by the Barrack and Hospital Improvement Commission, and by Miss Nightingale, and although they may be in some points modified, we believe that they will, in all essential respects, be approved by the Government. The principles of hospital construction and management have been so completely studied, and have been so completely verified by long experience in England and in France, that no doubt remains regarding them. There is no subject of which it can be asserted with greater confidence that it is thoroughly understood, and no subject on which all authorities are more unanimous.

Hospitals for native troops.

48. It may here be mentioned that the principles on which hospitals are to be constructed for native troops have also been laid down during the past year, in the same manner which has been followed in respect of hospitals for Europeans. Although the buildings for natives will necessarily be less elaborate and expensive, the principles of construction will be in both cases the same. Various other measures are proposed for improving the hospitals of the native troops,

* Secretary to Government of India, Military Department, No. 824, dated 25th November 1864, to Quartermaster General of the Army.

† Resolution, Government of India, Military Department, No. 388, dated 20th September 1864, and Resolution, Public Works Department, No. 902M—5629, dated 25th November 1864.

troops, for affording more hospital accommodation, and for improving the administration.

49. No sufficient arrangements had hitherto been made for affording medical assistance to the native servants attached to British regiments. It has now been determined by the Government that a small hospital for the reception of severe cases of sickness or accident occurring among native followers shall be provided near the regimental hospital; this will also be used as a dispensary where out-patients can attend to receive medicine.

Hospitals for native servants of British regiments.

50. The provision of new barracks to the full extent that is required must necessarily take a considerable time, whatever efforts be made to hasten the work. The Government has therefore ordered that in all cases in which the European soldiers have not the full amount of space in their barracks which has been determined upon as the standard, viz., 90 superficial feet of floor space per man, temporary accommodation shall at once be provided to the full extent required, whatever be the cost. These instructions are now being carried out. The Returns that have lately been received show that there are few barracks in this Presidency at the present time in which the full amount of 90 square feet per man is not afforded, and it is believed that, in a very short time, there will be none at all. So far as our information extends, there is even now no barrack which can be said to be crowded to an objectionable extent. We have not referred to the cubic space that is allowed, because this is always ample. It is seldom less than 1,200, and often more than 2,000 cubic feet per man.

Temporary arrangements for affording full amount of space in barracks and hospitals.

The Commission has lately represented to the Government that it would be desirable to issue similar orders with the object of preventing the possible overcrowding of the hospitals of the European troops. It has been recommended that whenever at any station the existing hospital accommodation is insufficient to provide for 12 per cent. of the average strength of the troops, at the rate of 130 superficial feet per patient, the standard rate which has been proposed for future adoption, temporary additional accommodation should be provided to the full extent required.*

Even when hospital accommodation is provided at this rate, it may sometimes happen, during especially unhealthy seasons, that it is insufficient. Such cases can only be provided for when they occur, and we believe that there can seldom be any great difficulty in meeting them. The principle should, we think, be acted upon, which has already been laid down by the Government on the recommendation of the Cholera Commission, for the prevention of crowding in hospitals during the prevalence of cholera. If temporary hospital accommodation cannot be given, all unimportant cases, the treatment of which in hospital is not essential, should be discharged. The following extract from the Report of the Cholera Commission is applicable to all exceptional occasions in which the number of sick is so large that the whole cannot be accommodated in the hospital: "Trifling cases of ordinary disease ought at such times to be considered of very little importance. They should receive a palliative treatment in barracks or in camp. It is far better that they should receive no treatment at all, than that they should be admitted into hospital."†

51. It has been determined by the Government that the work required for the permanent accommodation of the Army ought to be carried out in the shortest practicable time. It is believed that the whole may be finished in four or five years. The work comprises, first, the provision, whenever necessary, of entirely new barracks and other buildings for the European troops at the regular stations of the army; second, the improvement, whenever necessary, of all existing buildings, so that they may be made to afford accommodation approximately equal to the new scale which has been laid down; third, the formation of new hill sanatoria for the European troops; fourth, the construction of fortified forts and places of refuge; fifth, general works in military cantonments, such as roads, churches, water supply, lighting barracks with gas, drainage, conservancy, &c. &c.; sixth, provision, when necessary, of new accommodation

Magnitude of the works in progress for the permanent accommodation of the Army.

* Since this was written, these recommendations have been carried out, with this exception, that it has been considered necessary to substitute 100 for 130 square feet as the minimum space to be afforded.

† Report of Cholera Commission, Part III., Sec. 500.

accommodation for native troops; seventh, provision of temporary accommodation for European troops, pending the completion of permanent buildings; eighth, provision, when necessary, of officers' quarters; ninth, works required for the Ordnance and Commissariat Departments, bakeries, slaughter-houses, &c.

The probable total outlay upon these works is estimated at not less than 10 millions sterling.

We believe that it may safely be asserted that in no other country has the construction of works of such magnitude, and involving so great an expenditure, ever at one time been undertaken by a Government for the benefit of its soldiers. It is not less certain that, if these works be completed in the manner and upon the scale proposed, there will be no country in the world which can be compared to India in respect of the accommodation provided for the troops, and in the general arrangements made for their health and comfort.

Col. Crommelin's designs for barracks and hospitals.

52. The whole of the plans according to which the new barracks and hospitals and other buildings required for the accommodation of the European troops are to be constructed, have been prepared by Colonel Crommelin, R.E. Our Commission has frequently had occasion to express its opinion of the excellent manner in which this important work has been performed. The Government has been fortunate in obtaining for this purpose the services of an officer who possesses so complete a knowledge of the sanitary principles upon which military buildings should be constructed. It may be confidently stated that there are no barracks or hospitals in any country more thoroughly satisfactory than those which have been designed by Colonel Crommelin.

Ventilation and cooling of barracks and hospitals.

53. The important subject of the ventilation and cooling of barracks and hospitals, and of the application of tatties, thermantidotes, and punkahs, has been under consideration. Many experiments have been tried, some of which have apparently been successful, but which, generally speaking, have led to no good result. At Agra, five of the barracks have been fitted with thermantidotes, with underground channels to convey fresh air to all parts of the buildings, and the local authorities consider that the measure has been very beneficial. Similar plans had previously been carried out with great success in the Agra Central Prison, under the direction of Dr. Stewart Clark, Inspector General of Prisons, North-Western Provinces. It has now been determined by the Government that the whole subject ought to be taken up in a systematic manner, and that this can only be accomplished efficaciously by requiring a select body of officers, really qualified by special mechanical training, to experimentalise and report on the subject. A committee of experienced officers has consequently been appointed with this object at Roorkee, where the workshops afford special facilities for carrying on the necessary experiments.* We believe this to be a subject of great importance, and we hope that the investigations of the Committee may lead to very valuable results.

Provision of saddlery rooms in cavalry barracks.

54. One of the recommendations of the Royal Commission was to the effect that saddlery rooms should be provided in all cavalry barracks, and saddles removed out of the barrack rooms. The returns which we have received being incomplete, we are unable to assert that separate saddlery rooms everywhere exist; but the provision of such rooms has long been recognised by the Government as a matter of course, and if there are still cases in which saddles or harness are kept in cavalry or artillery barrack rooms, they are exceptional.

Lighting barracks and reading rooms. Introduction of gas.

55. One of the recommendations of the Royal Commission appointed to inquire into the sanitary state of the army in India referred to the necessity of improving the means of lighting the barracks and reading rooms in the evening. There can be no doubt that this is a matter of much importance. No small amount of intemperance and disease has its origin in the difficulty of employing themselves in a rational manner in the evening, which the men often experience in consequence of the imperfect lighting of the barracks. The provision of sufficient means of lighting is, however, not an easy matter. The question has been under the consideration of the Government of India during the past year,

* Secretary to Government of India, P. W. Department, No 657 M-4217, dated 2d September 1864, to Secretary to Government, North-Western-Provinces.

and the following extracts from the orders that have been given will show what has been done and what is proposed :—*

“The Government of India is satisfied that something must be done towards greatly improving the present system of lighting barrack buildings; and, although the data are very imperfect, they appear to afford sufficient grounds for leading to the inference that gas, which has been adopted almost universally elsewhere, should also be introduced into all Indian Military Cantonments. Wherever coal can be produced at moderate cost, it seems obvious that coal gas will be more economical than oil gas, and this will be the case in many stations. To arrive at a practical conclusion as to the probable cost of lighting with coal gas, it will be desirable to make an experiment at some convenient station where coal will certainly be the cheapest source of supply, and his Excellency in Council considers that Dinapoor is a suitable one at which to test the coal gas. * * *

The design being completed, as well as the information of the local officers will admit, it should be sent to the Secretary of State, with a request that it may be submitted to an experienced gas engineer in England, and that the needful steps may be taken for obtaining the plant, to be sent out with an intelligent person to superintend the execution of the works. * * * But as coal gas will not be procurable everywhere, the provision of oil gas will probably be necessary at many stations, if gas is to be used at all. From Lieutenant Colonel Robertson's estimate it seems likely that oil gas may be supplied at moderate prices; but this question is one that can only be fully tested by a trial, which should be made, if on further inquiry the cost does not seem excessive and the results are otherwise encouraging. His Excellency in Council, therefore, considers that a project should be prepared for some station where coal will almost certainly never be available, and where oil may be expected to be procured at reasonable cost, and that Rawul Pindee seems a good place to select for the purpose, unless the local government would desire the trial to be made at some other station.”

It is hoped that the result of these measures will be the general introduction of gas for lighting barracks, but as some time must necessarily elapse before this can be carried out, experiments are being made with the object of ascertaining whether, as a temporary arrangement, some of the improved cheap oil or other lamps of the present day might not at once be adopted, in supercession of the existing very imperfect oil lights. Calcutta is the only place in this Presidency which is now lighted with gas, and gas has been already introduced into the barracks in Fort William.

The grant of additional lights to reading-rooms, and to non-commissioned and married men's quarters, has been sanctioned by the Government.

56. The Royal Commission has stated in its Report that “means of recreation are few, of exercise none, of instruction limited;” that “the men's amusements, such as they are, are always connected, more or less, with drink, and they are everywhere most deficient in amount;” that “at most of the stations there are no workshops at present; while it is admitted that everywhere they would be most useful.” This subject is referred to in the fifth recommendation of the Commission.

We think that the Commission would certainly not have written in the terms quoted above, had it known how much had been accomplished in respect of these important matters before its Report was issued. We are far from saying that there was not, and is not still, much room for improvement, but there can be no question that in regard both to the useful employment and to the means of recreation of the soldiers more has been done in India than at home, or in any other part of the empire. Nearly two years before the issue of the Report of the Royal Commission, the Commander-in-Chief in India, Sir Hugh Rose, had instituted the admirable system of regimental workshops, which has since been developed with such excellent success. The system was established by General Order of the Commander in Chief on the 10th September 1861; and in General Orders of the 6th April 1864, Sir Hugh Rose stated that it had been introduced into five regiments of cavalry and 32 battalions of infantry in the Bengal Presidency. The following list is given of the trades that are practised: Tailors, carpenters, weavers, brushmakers, bookbinders, blacksmiths, tinsmiths, masons, labourers,

Regimental work-shops, reading and recreation rooms, &c.

* Resolution, Government of India, Public Works Department, No. 554—6 M.—3703, dated 8th August 1864.

labourers, watchmakers, painters and glaziers, sawyers, bakers, saddlers, wheelwrights, shoemakers, armourers, shoeing-smiths, gardeners, printers, turners, and engravers. According to the last Report, published in General Orders of the 6th June 1865, the number of men regularly employed in the workshops during the past year was 791; the amount of money actually realised for work done during the year was 15,787 *l.*, and there was stock in hand to the value of 6,123 *l.* "In publishing," says the General Order just referred to, "for general information, the reports of workshops in British regiments serving in the Bengal Presidency for the year ending 31st December 1864, His Excellency the Commander in Chief congratulates the army on the rapid and successful development of a system instituted by Sir Hugh Rose in September 1861. The system was in full working order in this Presidency in no less than three regiments of cavalry and 33 battalions of infantry. Conspicuous among these, His Excellency observes the 7th Dragoon Guards, the 7th, 19th, 42nd, 79th, and 91st regiments of foot, and the 2nd battalion of the Rifle Brigade. From recent returns received from the Madras and Bombay Presidencies, His Excellency is glad to find that workshops have been established in six battalions of infantry in the former; and in 14 batteries of Royal Artillery, two regiments of cavalry, and 10 battalions of infantry, in the latter; whilst the most distinguished regiments in these Presidencies are the 1st Royals, and 3rd Battalion 60th Rifles, the 1st Battalion 4th, 33rd, 44th, and 72nd Regiments of Foot. So satisfactory a result could not have been attained without the zealous endeavours of commanding officers, and the able and hearty co-operation of the individual officers more particularly connected with the workshops, and Sir William Mansfield desires to thank all those whose efforts have resulted in so marked a success."

The following extract from the General Orders of his Excellency the Commander in Chief, dated 6th April 1864, refers to other means of occupation and recreation that have been provided for the soldiers:—"His Excellency has seen at his inspections that the industrial system for children has been carried out with very good effect in several regiments; and that the soldiers' children, the girls, have not only learned to make their own clothes and to sew neatly, but have also acquired a useful and practical education, under the superintendence, in many cases, of excellent schoolmistresses. Generally speaking, throughout the army in Bengal, the system of manly exercises and out of door recreation, combined with gymnastics, has kept pace with the useful industrial occupation of the men. In many regiments, such as the 1st battalion 20th, 38th, 51st, and 101st Regiments, and the 3rd Battalion Rifle Brigade, each company has its cricket club, who play matches with other regiments in their stations, or among themselves, also quoits, bowls, &c., &c. There is not a regiment that has not its reading and recreation room, well furnished and fitted up, and supplied with the means of lighting, &c. These are in the evenings crowded with men, who can there obtain wholesome refreshments, tea, coffee, cold meat, &c. Spirits are not allowed. His Excellency has observed, too, with much gratification, the increasing popularity and success of regimental libraries, as shown by the number of subscribers; in the 3rd Battalion Rifle Brigade, 671; 2nd Battalion Rifle Brigade, 675; 81st Regiment, 640; 1st Battalion 7th Fusiliers, 607; 1st Battalion 23rd Regiment, 580; 34th Regiment, 523; 35th Regiment, 506; 80th Regiment, 504; 104th Regiment, 495; 1st Battalion 20th Regiment, 475; 71st Regiment, 440; 88th Regiment, 424; 90th Regiment, 412. Nor has this favourable state of things been confined to the Presidency of Bengal. His Excellency has received reports from the commanders in chief of both the Madras and Bombay armies, showing that great progress has been made by the regiments quartered in both these Presidencies towards the establishment of workshops, reading rooms, gymnasia, and other means of occupation and amusement. * * * To this system of useful employment and recreation may, in a great measure, be attributed a considerable decrease in the consumption of ardent spirits in this army, than which nothing can be more gratifying." In acknowledging the receipt of this Report, the Adjutant General was desired to "convey to his Excellency the Commander in Chief the cordial expression of the gratification with which the Government of India have received this satisfactory Report, showing, as it does, the hopeful growth and progress of a system so eminently calculated to improve, both morally and physically, the status of Her Majesty's British troops in this country. The Government of India has satisfaction in being able to congratulate Sir Hugh Rose upon the early success of this beneficial project, for the establishment

establishment of which his Excellency has evinced so much anxiety. The continued growth and extension of the system will always remain an object of great interest to the Government."

57. In the construction of the extensive works which have to be provided for the accommodation of the army, the Government of India has expressed the hope* that it may be found possible to give employment on a large scale to the European soldiers, with much advantage to themselves and to the State. In building the barracks at Asseerghur, and in carrying out other public works at that station, it was found impracticable to obtain a sufficient number of native workmen, and a party of soldiers was employed with great advantage in many occupations requiring both skilled and unskilled labour. Rates of pay varying from 8 annas to 1 rupee 4 annas a day, were given to the men, and in several instances the works were carried out within the estimated rates, and in some cases more cheaply than if they had been executed by native labour. The supervising officer of the Public Works Department reported that "the men have worked well, and conducted themselves admirably, always sober on the works without exception, and strictly obedient in the performance of whatever work may be pointed out to them; without the aid of the troops it is almost impossible to say when the barracks would be completed." The Government considered that similar measures to those carried out at Aseerghur might often be adopted, and that although during the hotter months the greater part of such operations must doubtless be performed by native labour, yet there will still be much room for the employment of the troops. "The Governor General in Council is of opinion that if the European troops, at stations where new barracks are about to be built, were, as fully as possible, employed on the building operations during the cold seasons, their utility would be greatly increased permanently, and that capabilities for performing similar work hereafter might be developed, which, under a proper system, could be maintained at no expense to the State, and with very great improvement both to the personal condition of the soldier, and to his utility to the Government." †

Employment of soldiers on public works.

In noticing the efforts that have been made to give employment to the soldiers, mention must also be made of the work that has been performed by them in the construction and improvement of the mountain road in the Himalaya between the stations of Murree and Abbottabad, in the Punjab.‡ The experiment of employing English soldiers on hill roads was tried in 1863 on a small scale, and was pronounced by the local and supreme Governments to have been very satisfactory in its results, except in a financial point of view. During 1864, the experiment was carried on upon a larger scale. The strength of the working parties was 600 men, consisting of detachments of the regiments stationed at Rawul Pindee, and the men were employed for a period of nearly six months, from May to October. They were under canvas for four months, and for two months in the rainy season they were accommodated in roughly built but commodious huts, at elevations of from 7,600 to 8,400 feet above the sea. The health of the men was excellent, and they appeared to derive great benefit from their employment in a fine climate. During the six months there were only two deaths among 632 men, one caused by fever contracted at Peshawur, and the other by an accident resulting from intemperance, in which state a man, out of working hours, fell down a precipice. Financially, there was an apparent excess of expenditure, amounting to 397*l.* over the sum which the work would have cost if the soldiers had not been employed, the total money value at average rates of the work done being 2,941*l.*, while the amount of working pay to the soldiers was 3,338*l.* But as a set-off against this apparent loss, it has to be considered that if these men had remained in the plains, it would have been necessary to provide additional temporary accommodation for them, unless the barracks at Rawul Pindee had been crowded to an extent which would have endangered the health of the whole of the European troops quartered there; and that either the work on these hill roads will not be done at all, or that the workmen, if hired, might have to be withdrawn

* Resolution, Government of India, Public Works Department, No. 938 M.-5815, dated 7th December 1864.

† Resolution of Government of India, Public Works Department.

‡ The foregoing account of these operations is taken from the Report by Lieutenant-Colonel, S. H. J. Davies, Executive Engineer in charge of the work.

drawn from the construction of the barracks at Rawul Pindee. It is hoped that, under improved arrangements, even the small loss that has actually occurred will be avoided in future. The Government has sanctioned the continuance of the experiment of employing soldiers on this work for another year.*

Soldiers' gardens.

58. The Royal Commission recommended the establishment of "soldiers' gardens, in connection with the station, wherever practicable." The Commission does not appear to have been aware of the great and successful efforts which had been made with this object by his Excellency Sir Hugh Rose, long before the publication of its Report. The progress made in the establishment of soldiers' gardens has been so rapid that, in the General Orders of the Commander-in-Chief, dated 5th July 1864, publishing rules for their construction, working, and maintenance, Sir Hugh Rose was able to express the hope "that with the liberal aid afforded by Government, every barrack square in India will shortly be similarly improved and ornamented."

"Soldiers' Gardens"—we quote from the General Order just referred to—"are of two kinds; 1st, small garden plots immediately in front or rear of each company, sub-division, or married barrack; and 2d, large gardens situated at a convenient distance from the barracks. This latter description of garden is usually laid out with taste, and affords a pleasant and agreeable lounge for the soldier. Gardens of the first description are usually irrigated by the surplus water from the lavatories, and as they are of small extent, the produce obtained for them is only sufficient to supply some trifling addition to the cultivator's ration. Experience, however, has proved that gardens of the second description, if of sufficient size, will, under judicious management, and provided they have been fairly started, not only pay their own expenses, but leave a considerable surplus."

A separate fund, called the garden fund, has been established in each regiment of cavalry and infantry, in each division or battery of artillery, and at each convalescent dépôt. The first expense of turning up the soil, and enclosing the garden with a fence or wall, is borne by the Government. The necessary arrangements for maintaining a sufficient supply of water for irrigating the gardens, for keeping the wells, reservoirs, and water-courses in proper order, for supplying gardening tools, and vegetable and flower seeds, are also made at the expense of the Government. So far as is practicable, the Commissariat Department is bound to have recourse to the soldiers' gardens in providing vegetables to the troops, and to pay a fair price for the vegetables furnished. Prizes are given every year to the soldiers who have been the most industrious and successful in gardening; the day on which the prizes are distributed is made a general holiday for the regiment, "the band playing at the place of distribution, and the regimental school children attending while the distribution takes place," and Sir Hugh Rose hoped that all the officers would make a point of being present. When a regiment leaves a station, native gardeners are entertained to keep up the garden until it is taken over by another regiment.

Improvement of
beds and bedding
in barracks and
hospitals.

59. Among the subjects affecting the health and comfort of the European troops which have been taken up by the Government of India during the past year, the improvement of the beds and bedding is one of much importance. For a long time past there has been great and reasonable complaint on this head. The bedsteads have generally been very unsatisfactory, being mostly made of wood and infested with vermin to an extent which can hardly be exaggerated. The bedding also has been very bad; no mattresses, or palliasses, or bolsters have been allowed, although they are furnished to the soldiers in England and in all the Colonies; wadded cotton quilts which cannot be washed, and which are frequently in a more or less filthy and unwholesome condition, have been supplied, with blankets of Indian manufacture and very inferior quality. The number of sheets allowed has been insufficient for cleanliness or decency, and their quality has been bad. The bedding, when once issued to the soldier, has been considered his property, and, under the system which has prevailed, there has

* Resolution, Government of India, Public Works Department, No. 129-30 M. 783, dated 13th February 1865.

has been no security, and indeed hardly a possibility, that the bedding should be kept clean and in proper order. Our Commission has recommended to the Government the introduction of a system similar to that in force in England and in the Colonies, under which bedding is not given to the soldier as his property, but is furnished by the barrack department in the same manner in which furniture and all other barrack stores are issued. Barrack masters are there responsible for keeping the whole of the bedding in a proper state of cleanliness and repair, for ensuring that every soldier has a comfortable bed, and for providing him with clean articles of bedding whenever necessary. These recommendations have been approved by the Government, and orders have been issued for carrying them into effect. Every soldier will be provided with a good iron cot, and every bed will be furnished with a comfortable palliasse, a bolster, a small setringlee or cotton rug, two sheets, two English blankets, and a leather strap. It is believed that this most useful reform will be carried out not only without any additional annual expenditure, but that it will lead to an actual saving of money. Similar important improvements will be carried out in the system of supplying bedding to the hospitals. Some of these have been already sanctioned; but as the question of hospital bedding has not been entirely disposed of, we shall not now enter into further details.

Orders have also been issued for placing on a more satisfactory footing the supply of bedding to troops on board ship proceeding to England. The men have hitherto taken with them their Indian bedding, consisting of the ordinary wadded cotton quilts and country blankets. The quilts were found to be most inconvenient on account of their bulk, and were often so offensive that it was necessary to throw them overboard. English blankets will now be furnished to all men proceeding home, and to invalids, and to soldiers' wives, according to the scale laid down in the Regulations for Her Majesty's Transport Service.

60. A revised system of camp equipage for the army in India was proposed during the past year by his Excellency the Commander in Chief, and measures have been taken which, it is hoped, will lead to great improvements in the pattern of the tents supplied to the troops. Although the tents furnished in India are probably far superior to those allowed to any other army in the world, their ventilation has hitherto been defective, and there are considerable practical difficulties to be overcome before this will be completely remedied.

Improvements in camp equipage.

61. In the provision of ablution and bath accommodation there has been great improvement since the evidence before the Royal Commission was taken. Ablution rooms are everywhere provided, with a fair supply of water; and, as we have noticed in another part of this Report, four separate rooms where men can bathe privately have been furnished during the past year for each company. These will be increased hereafter to seven or eight, when ablution rooms are built according to the plans that have been lately sanctioned. Swimming baths have been very generally constructed at the stations for European troops; and, under the new orders, to which reference has been made elsewhere, there will be a bath of this kind for each wing of every regiment.

Provision of ablution and bath accommodation.

Although very much has been done to improve the ablution and bath accommodation, it will not become really satisfactory until better arrangements are made for affording a more ample supply of water than is now usually available at our Indian stations. It is proposed that experiments on a large scale shall be undertaken at some of the principal stations with the view of ascertaining what plans are practically the best. Measures of this kind were sanctioned last year for Fort William, and these have already made great progress towards completion. The scheme that has been adopted was prepared by Captain Trevor, R.E., Garrison Engineer. The best water in Calcutta has been proved by analysis and by experience to be that of carefully preserved tanks on the maidan. These, therefore, will be the source of supply for drinking, cooking, and ablutionary purposes, and 20 gallons per day will be furnished for 5,000 persons, a number much larger than the actual population of the fort. This water will be supplied partly at a high and partly at a low level. The water for the high level service will be pumped into iron reservoirs placed on the roof of the Dalhousie barrack, and capable, in the aggregate, of containing a sufficient supply for all the upper-roomed barracks of the Fort. The low level supply will be pumped into a reservoir in a suitable situation, and the water will be distributed by means of iron pipes, with taps and stand-pipes in convenient places.

In addition to this water supplied for personal requirements, 30 gallons per head for 5,000 persons, will be pumped up from the river, and after filtration, will be distributed by means of open masonry aqueducts carried along the main roads, with small reservoirs in convenient positions.

Analysis of
drinking water.

62. One of the recommendations made in the Report of the Royal Commission is "that all existing water sources be subjected to analysis, and those rejected which contain matters injurious to health." There can be no doubt of the importance of this subject, and regarding it we have already addressed the Government. It has been under the careful consideration of our Commission, and we have consulted many experienced chemists and other authorities regarding the manner in which the necessary measures should be carried out. The obstacles in this country in the way of an inquiry of this kind are very great. There are few officers competent to undertake the work, which is one of much difficulty, requiring for its satisfactory performance altogether special qualifications; and we have found the differences of opinion among the highest authorities almost irreconcilable, as to the manner in which even the purely chemical part of the investigation ought to be carried on. Nor will any mere chemical analysis be sufficient to enable us to determine, in the majority of cases, either whether the water is wholesome, or what practical measures ought to be taken for the improvement of existing sources of supply. We have been unable hitherto to make any final recommendations to the Government regarding the procedure which ought uniformly to be followed with the view of obtaining the greatest amount of advantage, but we hope before long to do so. Meanwhile the discussion of the question by our Commission has not been fruitless. An analysis of the water supplied to the troops at the principal stations of the North-Western Provinces and the Punjab has been already ordered to be undertaken, and the inquiry has been going on for some months. We have hitherto received hardly any reports of what has actually been done. These operations, although they will certainly not be in themselves sufficient, will be a very useful preparation for the more complete measures which we hope to see carried out.

Filtration of water
in barracks and
hospitals.

63. The Royal Commission appears to have been under the impression that no means of filtration were adopted in barrack. This is incorrect, so far at least as this presidency is concerned. For some years past, two filters have been supplied to every barrack and hospital, whenever the medical authorities have recommended their use. It is believed that they are now everywhere furnished. These filters are made according to the method very commonly followed in this country. Each filter consists of three earthen jars, the two upper ones being partially filled with sand and charcoal. For the removal of impurities in suspension, these filters are very effectual, if proper care be taken of them, but they cannot be considered always to afford sufficient means for the purification of the water supplied to the troops.

Diet of European
troops in India.

64. The subject of the diet of the troops in India received much attention in the Report of the Royal Commission. It is one of so much importance, and so much discussion has taken place regarding it, that it is desirable that we should show in detail what has been done. The following memorandum has been prepared for this purpose by Dr. C. A. Gordon, one of the members of our Commission. There can, we think, be no doubt that when the orders issued by the Government during the past year have been completely carried into effect, hardly anything will remain to be done for the improvement of the diet of the troops.

G. O. G. G., 28th
October 1853, and
G. O. C. C., 11th
November 1853.

"Since 1853, the daily ration of the soldier in India has consisted of the following articles, namely:—

Bread	-	-	-	-	-	-	-	-	1 lb.
Meat	-	-	-	-	-	-	-	-	1 "
Vegetables	-	-	-	-	-	-	-	-	1 "
Rice	-	-	-	-	-	-	-	-	4 ozs.
Sugar	-	-	-	-	-	-	-	-	2½ "
Tea	-	-	-	-	-	-	-	-	½ "
Salt	-	-	-	-	-	-	-	-	1 "

“ In 1864, a few modifications in the quantities of some of these items were authorised. These will be alluded to hereafter; but it is desirable that, for the present, we consider the ration as it existed at the time the Royal Commission on the Sanitary state of the Army in India was sitting.

“ The meat ration consists of beef during five days per week, and mutton on the two remaining, as had been the case for several years previous. The meat to be cut up in joints, the ribs and upper joints of the fore legs excluded. The bread to be of the best quality, and equal to that provided for hospital diet. The vegetables to be such as are procurable at different stations, and in different seasons. The ration of tea, to consist, as a rule, of one-third green, and two-thirds black. Coffee might, however, be substituted for tea, in the proportion of 2 lbs. of the former to 1lb. of the latter.

G. O. G. G., 9th August 1844, and G. O. C. C., 23d August 1844.

“ For the purpose of cooking this ration, a daily allowance of fire-wood, equal to 3 lbs. per man, was allowed. Cooking is performed by natives, who, as a rule, are men reared up from boyhood with regiments, and who, although actually untrained, understand nevertheless the particular taste of the soldiers, and are seldom unable, even under the most adverse circumstances of field service, to serve up a savoury and palatable, if not a very elegant meal. The means of cooking this ration were described before the Royal Commission as ‘ of the rudest order; a small square out-house, sometimes without a chimney, often far from clean, is the regimental kitchen. As for boilers and ovens, considered indispensable at home, there are none. A few holes to put the fire in, and moveable utensils to hold over them, are all that India thinks it wants.’ The hours at which, as a rule, meals were served up, were as follow, namely :—7 to 8 a.m., breakfast; 1 p.m., dinner; 5 p.m., tea. There has hitherto been no modification in this scale, either according to season or according to station, except that inasmuch as the quality of the meat ration is in some parts of India much better than at others, and that European esculents and vegetables, which grow in profusion in some parts of the country, can in others be reared only in small quantity, the ration necessarily varied in this respect.

Vol. I., p. 356.

“ In regard to the dietary so constituted, the Royal Commission expressed the opinion that, with reference to the amount of work the soldier in India has to perform, it is injurious to his health; and the Government might try to induce the men, by varying the ration with reference to hot and cold weather, to use more vegetable diet and fruit, and less animal food.

“ That the ration does not constitute the whole quantity of food consumed by a soldier daily, is well known to all regimental officers. There is, in fact, in almost all regiments a system of what is called extra messing, on account of which a sum varying from half an anna to two annas per man is daily stopped. From the amount of these stoppages, milk, curry stuff, eggs, spices for puddings, and other little articles of luxury are obtained, and the cooks paid. In fact, ample evidence to this effect is given before the Royal Commission. Thus, one witness informs that body that the soldier, especially if he be married, purchases salt, pork, or bacon in the bazaar; and adds that, if his family be large, he obtains fresh meat of an inferior kind. Another states that the men not unfrequently purchase bazaar pork and bacon, which, from the foul feeding of the animals, is unwholesome.

Qs. 3134-3200.

Qs. 2942 to 3036.

“ Dr. Parkes gives, in a tabular form, the relative proportions of the alimentary constituents, in the ordinary diet of the soldier at home and in India, and from his tables the following have been prepared, namely :—

Hygiene, pp. 144 and 564.

	AT HOME.	INDIA.
	Oz.	Oz.
Of water - - - - -	38·88	30·07
Nitrogenous Substances - -	3·86	4·36
Fat - - - - -	1·30	1·38
Carbo-hydrates - - - - -	17·35	14·47
Salts - - - - -	·80	1·54
TOTALS - - -	62·19	51·82

“ It is clear according to this table that, as regards mere bulk, the ration of the soldier in India is very nearly one-sixth less than it is at home; in order therefore to exhibit the cause of this difference, it may be well to place in a table, side by side, the proportion of

the above constituents stated to be contained in each ingredient of the soldier's diet. This is accordingly done in the succeeding Table :—

	WATER.		NITROGENOUS.		FAT.		CARBO-HYDRATES.		SALTS.	
	Home.	India.	Home.	India.	Home.	India.	Home.	India.	Home.	India.
Meat - - -	7·2	9·6	1·44	1·92	·8	1·07	-	-	·154	·2
Bread - - -	9·6	6·4	1·92	1·28	·36	·24	11·73	7·8	·312	·2
Potatoes - - -	11·84	13·6	·24	·96	·02	·04	3·75	·93	·020	·11
Other Vegetables -	7·28		·16		·04		·46		·050	
Rice - - -	-	·4	-	·20	-	·03	-	3·33	-	·02
Milk - - -	2·92	-	·1	-	·08	-	·13	-	·016	-
Sugar - - -	0·04	·075	-	-	-	-	1·28	2·41	·006	·012
Salt - - -	-	-	-	-	-	-	-	-	·25	1·
TOTAL - - -	38·88	30·075	3·86	4·36	1·30	1·38	17·35	14·47	·808	1·542

P. 564.

"With reference to the constituents of the diets, Dr. Parkes remarks that it is slightly more nitrogenous in India, and less rich in starches; and he thinks that although no doubt it would be too much for a perfectly idle man, it would not be so were the amount of exercise that of the home standard. At page 145 of his work, already quoted, however, he thus expresses himself: 'The ration of the English soldier at home therefore appears to be deficient to a certain extent in albumates; to be very poor in fat and to be in excess in starches. The fresh vegetables are sufficient. It would be improved by the addition of some meat, or what perhaps would be better, two ounces of cheese, some fatty food, such as bacon, butter, or by greater use of oil in cooking; and by a larger employment of beans and peas.' He would also, with Robert Jackson, continue a ration of vinegar.

Lewis, p. 65.

"Two important facts may here be noted in regard to the soldier's ration at home, namely, that according to the opinion of Dr. Parkes, it is in time of war quite insufficient; and that the articles in which he considers the ration is most deficient are precisely those which, as already observed, the soldier in India most seeks after, namely, cheese and fatty food, such as bacon. The circumstance is further of importance as illustrating a remark made by Messrs. Lewis and Gilbert, to the effect that the underfed labouring classes manifest an instinctive preference to fat meat, such as pork, over those meats that are thinner and more nitrogenous.

Qy. 424, Royal Commission.

"Numerous opinions of a conflicting nature, as regards the supposed superabundance or deficiency of the soldier's ration in India, have been given; thus Colonel Swatman considered it was not enough, and that in damp climates experience taught that men should be better fed.

Qs. 3512 and 3540.

"According to Dr. Reed, men should be well dieted, the appetite being capricious, and he adds his reason for this opinion, to which special attention ought to be given, namely, that 'the waste of constitution being greater in hot climates, the diet should be more nutritious.' No doubt here he means, more easily assimilated.

Qs. 3895 and 3900.

"Again, Brigadier General Russell, C.B., stated that the 84th Regiment, when in Burmah, had a contract for 8 oz. of mutton and 4 oz. of bread beyond the regular ration.

Para. 89 of Proceedings.

"The medical member of the Commissariat Commission in India believed that an increase of the meat ration to the extent of $\frac{1}{4}$ lb. in the cold weather would tend more speedily to recover the men from the prostration entailed by severe heats, and render them more capable of enduring the fatigue required of them during the drill season.

Ind. An. for 1858, p. 106.

"On the other hand, Dr. Macnamara has found fatty and otherwise diseased liver to a great extent among men thus overfed; and attributes these diseases to the circumstance of the men being overfed. While the opinion given by the Commissariat Commission seems merely to express that that body considered the ration authorised by Government, if properly carried out, is sufficient to preserve the soldier in health and vigour, and is on a more liberal scale than exists in any other part of the world.

Para. 245, page 63.

"This Commission does not seem, however, to have noted the fact that in our Colonies the soldiers have the advantage of an occasional salt ration, which in India they have not, although evidence exists which indicates the advantage of such a variety; thus, it is on record that in Burmah, soldiers and sailors were employed on the same expedition inland. The former had 16 oz. of lean tough beef, the sailor $9\frac{1}{2}$ oz. of salt pork. Here the sailor, although exposed to the climate night and day, while the soldiers were well housed, suffered less from climate and disease than the latter, who, it is said, looked with longing eyes on the pea-soup and plum puddings which the sailors cooked just as if they were on board ship.

Vol. II., Appendix to Proceedings of Royal Commission on India, p. 185.

"The

"The opinion of the President of the late Cholera Commission on this subject, is thus given: 'The quantity of meat allowed daily to the soldier has often been declared by high medical authorities to be too great for a tropical climate, and it has been recommended that the meat ration should be diminished during the hot season, vegetable food being substituted. I believe that almost all that is said upon this subject is purely theoretical, and quite valueless for any practical purpose.'

App. J., Commissariat Commission Report, para. 24.

"So also in reference to the implied dependence of hepatic disease among soldiers in India, to the quantity of meat they consume during the hot season, it may be well to note that Dr. Hooker found that herbivorous animals brought to the plains of India from elevated and therefore cold ranges, speedily became affected with similar affections.

Hooker's Travels Sikkim.

"An argument is often brought forward that the habits of natives of particular countries, as being the best for the circumstances of these people, ought to be adopted by foreigners, and there are not wanting men of very great eminence who strenuously advocate this doctrine. It seems, however, a somewhat dangerous principle to attribute the habits of any particular country to the effects of climate alone; we know in fact that not only climate, but religious prejudices, agricultural capabilities of the country, and financial prosperity or otherwise of the people, combine with more or less force to establish these habits. Thus we find natives of corresponding latitudes have very different habits as regards animal food: thus the aborigines of tropical Africa are large eaters of flesh, and those of tropical China, instead of living, as does the poor Hindoo, on cereals with or without additions as the latter can afford, devour enormous quantities of the fattest of fat pork, geese and ducks.

"Nor is it always safe to assume that because the mass of a people adopt a particular dietary, it is therefore the best suited to their personal requirements as regards health; far less to the requirements of foreigners residing temporarily among them; thus thousands of Irish subsist chiefly upon potatoes and milk, millions of Hindoos on rice and rancid butter.

"As to the effects of this defective diet upon the Irish, Dr. Carpenter states that the races who are restricted to it have, within a period of 200 years, degenerated so as to be now of low stature, to have pot bellies and bow legs; whilst their open projecting mouths, prominent teeth, exposed gums, advancing cheek bones, and depressed noses, bear barbarism in their very front. And with regard to the Hindoo, Lewis informs us that large as is the stomach of the ryot, it could not with impunity take in and digest the quantity of rice which would be sufficient day by day to supply the wants of the system; and that, unless one-fourth to one-third of pulse or dried fish be added to supply the nitrogenous elements, these people become diseased, acquire pot bellies, and show signs of starvation in every feature. The fact is notorious that so soon as the pecuniary condition of the Hindoo begins to improve, he indulges in such quantities of fats, such as clarified butter and vegetable oils, as his finances afford; thus as far as practicable adopting the same nutritious elements as exist in a different form in the food of the soldier.

Manual of Physiology, para. 420.

P. 58.

"But whatever theory may suggest in respect to this matter, we find in reality that the soldier in India will absolutely refuse to exchange the habits in which he was reared for those of the natives by whom he is surrounded. 'As a matter of fact,' says Mr. Strachey, 'Europeans are no more inclined to adopt a vegetable diet in India than they are in Europe.' 'Bread and fruit and vegetables are generally in India of indifferent quality.' 'Not very palatable.' 'And although it may be true in theory that we all eat too much animal food, we feel in practice that we shall eat it or nothing.' 'European appetites in India during extreme heat are constantly in an abnormal state, and more or less capricious, and it is useless to place people upon a diet which they dislike, however excellent it may be theoretically. It must be added, that the hot and rainy season, when meat is supposed to be especially objectionable, is the very time when there are hardly any vegetables which an Englishman can eat.'

Appendix J., para. 24, p. 6. Report Commissariat Commission.

"Let us now consider how far the purely chemical theory of food is to be trusted. Mr. Lewis informs his readers that a great mistake is made when it is imagined that the nutritive value of foods can chiefly reside in the amounts of carbon, nitrogen, oxygen and salts which they contain. It resides, as he well observes, in the relation which the several substances bear to the organism they are to nourish; thus, the indications of chemistry in regard to the relative values of food are often at variance with the results of experience. For example, he mentions that wheat contains only 2.3 per cent. of nitrogen; beans, 5.5; lentils, 4.4; and peas, 4.3; and yet, wheat is in reality superior in nutritive value to beans, lentils, or peas.

P. 40. Phys. of Common Life.

"So in regard to the often repeated assertion that in a cold climate, the carbonaceous or respiratory elements are most requisite, and in a hot, the nitrogenous. He informs his readers that the Sicilian and Neapolitan eat more oil than the Swede; that according to theory the Hindoo should eat very little non-nitrogenous food; whereas, according to fact, he eats very little nitrogenous food, and a great deal of heat-making food.

P. 40.

"But even granting that the chemical theory is so far correct that recent waste of tissues requires to be met by nitrogenous elements of food, there is sufficient in the circumstances of the soldier's existence in India to justify his being supplied with a liberal ration of this description.

"It is true that he does not, as a rule, undergo the same amount of bodily exertion as he does on home service. It is no less true, however, that destruction of his tissues takes place with a rapidity unknown in temperate climates. Nitrogenous matters in the form of the salts eliminated in perspiration are plentifully discharged by the skin as well as by the other

Carpenter's Manual
of Physiology, para.
485.

ordinary channels; muscular fibre becomes lax and fatty, and the process of wear and tear, although not amenable to chemical tests, proceeds with a rapidity and to an extent unknown to be produced by the greatest bodily exertion in a temperate climate. Hence, on this ground, if nitrogenous food be intended to supply the expenditure of tissue, a liberal allowance of it is indicated in India. But it is not only nutriment that the system demands; a certain amount of bulk is necessary in order that digestion may proceed; hence experience shows that when food is nutritious in its character but of small bulk, advantage is obtained from mixing it with more nitrogenous substances in order to give it bulk and solidity. Nor must we forget that in regard to food, original tastes and habits exercise a most powerful influence upon the soldiers, as indeed upon all other classes, and that to effect a change in these, even were it otherwise practicable to do so, would not be effected without much personal inconvenience and even injury to individuals.

"Various circumstances which may be looked upon as exceptional combine to render the question of rationing troops in India a matter of more than usual difficulty.

Health of European
soldiers, p. 112.

"Thus, in regard to meat, the fact is to be noticed that breeding of cattle for shambles forms no part of the occupation of the Hindoo; and the prejudices of the people are opposed to their being reared and sold for slaughter. The demands of agriculture, too, and for transport of produce, are so great that a scarcity of cattle in some parts of India already exists. For several months in the year fodder and grass are scarce. The natives have not yet learned the art of improving breeds of cattle. The animals supplied to meat contractors, if not so young as to be immature, and their meat thus wanting in the full proportion of nutritive elements, have been severely worked in the cart, or at the plough, while their food has been insufficient in quantity and often deficient in nourishing qualities. Hence, as might be expected, the flesh is dry, fibrous, tough, deficient in gelatinous matter, and wanting in aroma. Indeed, Dr. Chevers is of opinion that unless well and carefully fed, the flesh of oxen and sheep is unwholesome.

Appendix J., p. 6,
para. 24 of Presi-
dency Commissariat
Commission.

"Nor is it at all times certain that the soldier receives the full amount of his ration, for Mr. Strachey states that 'of the frauds of the contractors in this respect he himself saw an example at Meean Meer. Merely by cutting off a smaller quantity of bone than that permitted by regulations, the contractor saved 16 lbs. of meat from each carcass,' thus giving the contractor a profit of 20 lbs. from one regiment.

A. G. H. M's. Force,
Circular, 9th July
1858.

"Mutton is poor, thin, and unpalatable; nor is this all. Sheep in India, contrary to their nature in Britain, are known to be sometimes fed upon matters little, if at all, less filthy in their nature than those that constitute the food of pigs, and the latter, as is now well known, are brought up on food so loathsome in its nature that tape-worm and other diseases are rapidly engendered in those who partake of their flesh. In fact, so well was this known several years ago in India, that in 1858, its use by soldiers was prohibited.

Para. 81, page 24.

"The Commissariat Commission took into its serious consideration the practicability or otherwise of improving the quality of the soldiers' rations in India. They considered the question in its financial bearings, and have entered into some particulars that may be of interest, as showing the enormous expense incurred by the mere dieting of troops in the Bengal Presidency.

Para. 91, page 26.

"By the Report of this Commission, it appears that the sum actually paid by the soldier in India for his ration is at the rate of Rs. 6. 5. 4. per month, whereas its actual cost to Government is Rs. 9. 5. 5½, making a cost per annum of above 175,000 l.

Para. 89, page 26.

"Were cattle and sheep to be stall fed, a period of six months would be required to effect sufficient improvement in them to render the measure of any use, as it appears that for some time after animals experimented upon have been submitted to the process their condition actually falls off. This then would occasion an extra expense of not less than 187,674 l. 18 s. per annum; or, in all, to supply the troops with stall-fed meat, 111,009 head of horned cattle, and 195,590 sheep, at an aggregate cost of 362,674 l. 18 s. would be required; which, for an approximate strength of 39,000 effectives, would give 9 l. 4 s. per man per annum for meat alone.

Appendix to Com-
missariat Commis-
sion, Report J., page
5, para. 22.

"It may be here noted that, with reference to the proposal made by some officers that the soldier should during the cold season have ¼ lb. of meat beyond that now allowed to him, the Commission calculated its cost to amount to 12,099 l. 14s., an expense, according to the Report, 'the necessity of which is not sufficiently apparent to induce the Commission to recommend it.'

"The bread issued to soldiers has of late years undergone very great improvements, and further improvements in its quality are contemplated. The 'Sojee' from which it is manufactured contains a considerable amount of gluten, and the juice of the palm tree having been often used in substitution of yeast, the loaves were during the hot and damp weather liable to become sour during the after portion of the day.

Para. 210, page 55.

"The supply of good vegetables to the troops is a difficulty, which it is far from easy to get over. During the hot weather and rains there are almost no vegetables that Europeans care to eat. With the exception of potatoes there are very few vegetables, either European or Native, which the soldiers think worth eating, and a large portion of the vegetable ration is never consumed by them. The Commissariat Commission allows that there is a period during the hot weather and rains when no arrangement can secure even a ration of potatoes for the soldier; the heat and damp of the climate being such as to render their transport through the plains so wasteful as to be practicably impossible. The same Commission reports that, from 15th June to 15th October, potatoes are not considered wholesome; and gives a list showing in detail the stations and divisions at which the greatest difficulty is experienced in procuring a supply. According to that list, it would seem that in the Cawnpore and Lucknow Divisions potatoes are only procurable during the months from July to

November

November inclusive, by being brought from the hills at a loss of 50 per cent. At Meerut they are unwholesome and unfit for food from 15th June to 1st October; at Lahore they are not eatable in July and August; at Sealkote, not obtainable in July, August, and September; at Peshawur, not obtainable in July and August; while at Mooltan the supply is impracticable in August, September, and October; and at the Hill Stations of Kussowlie, Subathoo, Dugshai, and Jutogh, potatoes are not good from June to September inclusive. With reference to these observations, however, it may be noted that at the Hill Stations named, various European vegetables are in season during the time that potatoes are not procurable, and that the daily extending facilities afforded by the railway are rapidly diminishing the difficulties here complained of. For example, in 1863, potatoes were issued throughout the whole year to the troops at Mooltan.

"It now becomes necessary to give a brief summary of the measures that have from time to time been taken by the Government of India, and by his Excellency the Commander-in-Chief to effect the greatest amount of improvement in the victualling of the soldier that the circumstances of the country rendered practicable.

"With regard to the general subject of rations, the following are the more important of the measures that have been promulgated.

"In 1861 the then Commander-in-Chief observed that in almost every corps the messing of the soldier was not sufficiently attended to. His Excellency therefore directed that the utmost attention should be paid to it; that officers should use their endeavours to induce the men to expend a small sum towards bettering their ration, and that commanding officers should see that the articles provided are of good quality.

"In 1862 a Special Commission was formed under the orders of Government to inquire into and report upon the entire question of rationing the troops. In 1864 the conclusions at which it arrived were published, and such of them as were approved by Government directed to be adopted. On this occasion Government endorsed the opinion expressed by the Commission that the ration was itself sufficient, and that any assertion that may have been made that the health of the troops had suffered from defect in quantity or quality of food was without foundation. It approved the suggestions that Commissariat officers be themselves responsible for the quality of rations; that fair and remunerative rates be paid for meat of all kinds, the better to encourage competition; that to prevent undue pressure being put on the supply of mutton, the troops have a ration of it only once a week; and that to prevent the destruction of brood stock, not more than one-third of the sheep killed for rations be ewes.

"The only modifications that appeared necessary were that, with reference to the large quantity of rice allowed to the soldier, an equal quantity of flour be substituted for it at the option of the soldier; the arrangement being made for a fixed period of not less than fifteen days at a time. That for the future the entire ration of tea consist, as a general rule, of black. That the daily allowance of salt be reduced to two-thirds of an ounce. That to enable the soldier to have a cup of tea or coffee in the early morning, arrangements to be made with regimental canteens so as to ensure good and clean utensils for the purpose. And that a store of groceries be kept on hand by each regiment, equal to fifteen days' consumption. Orders were issued to the effect that the breakfast hour for the soldiers should be 8½ a.m., dinner at 2½ p.m.; those who desire to have a pint of beer, to have it issued to them so as to be taken at the same time; and that the time for tea should be immediately after evening parade: these hours to be adhered to throughout the year.

"Proposals have been submitted that cooking be performed under the superintendence of trained Europeans, and that kitchens, with all necessary appliances, be built; and the Public Works Department have had this matter referred to them in view to the necessary plans being prepared.

"With a view to obtain an improved meat ration, the Commissariat Commission recommended that the slaughter-houses be visited by the sanitary officer at least once a fortnight; and that, as was the case from 1822 to 1853, a qualified non-commissioned officer be appointed for the purpose of inspecting the issue of fodder, and attending to all matters connected with the selection and slaughter of cattle required for the meat ration.

"And in order to effect improvement in the bread, it has been recommended that it be henceforward prepared by Commissariat Agency; that instead of being made as heretofore from soojee, it be made from flour ground in proper mills; hop and potatoe yeast being substituted for palm juice, and Stephen's Kneading Machines brought into use. Also that proper bakeries be erected, and Bovell's Blast Mills imported for the purpose of grinding the flour. With reference to this recommendation, it is right to record the fact that early in June 1865, the writer of this memorandum tasted a loaf prepared from country flour, as recommended by the Commission, Colonel Macpherson, C.B., Commissary General, having had samples sent to him from Dinapore. This sample was sweet, light, well-raised, and although kept during two days in the moist heat of Calcutta, perfectly fresh and very palatable at the end of that time. So far, then, the experiment has been a success.

"The custom has hitherto been to give as substitutes for vegetables, dhall, that is, ground pulse, when indigenous vegetables were not procurable; but so long as these could be obtained, they were looked upon as sufficient substitutes for potatoes. Neither of these, however, are, anti-scorbutic, and could not be looked upon as substitutes for such vegetables as have these properties. Hence, there has never been any doubt as to the desirability for arrangements to secure to the soldiers greater variety than they had hitherto enjoyed in regard to this important portion of their ration. Various measures have from time to time been proposed with a view to obtain for the soldier an improved supply. In

Appendix 2.

A. G. Circular, 24th July 1861.

G. O. C. C., 13th May 1864.

A. G. Circular, 161 E., 16th December 1864.

Standing Orders, May 1864, p. 95.

Para 287.

G. O. G. G., 25th October 1822, 704, 9th September 1863 G. O. G. G., 136 of 6th February 1865.

Para. 346. Report of Commission.

Qy. of Royal Commission, 1432-1458, 1523, 1524.

G. O. C. C., 3d April 1860.

G. O. C. C., 5th July.

7th September, published in G. O. C. C., 8th October 1860.

1860, the supply to regiments of seeds of English and country vegetables was sanctioned for soldiers' gardens. In 1864, further instructions on the same subject were given in orders, and authority given for the supply of vegetable seeds on requisition: the English vegetable seeds to consist of cauliflower and lettuce, the indigenous of the egg plant, and pumpkin. In September of the following year a Government General Order directed, among other points, that steps should be taken at particular stations to show the probable quantity of vegetables of different kinds that could be supplied during each month from soldiers' gardens, to fix a suitable price to be paid to the soldier for these, and to determine, if the supply from this source cannot be depended upon, what description and quantity can be obtained from other sources during the different months. With a view, as far as possible, to encourage the cultivation of those vegetables held in greatest esteem by the soldier, Government has adopted the suggestion of the Commission, that fairs be held and prizes awarded for the best specimens exhibited; and also that, as far as practicable, vegetables shall be raised in gardens attached to gaols; being purchased from these by the Commissariat Department so long as the arrangement shall not interfere with the interests of contractors.

Para. 211.

"A recommendation has also been submitted by several Commanding and Medical Officers that cruciferous vegetables be pickled during the cold season and issued during the hot. The Commissariat Commission, however, does not support the suggestion, although the grounds upon which they refuse to adopt it do not appear. In the dietary of the Russian soldier, pickled vegetables form an important item, as do other anti-scorbutic ingredients, and, as Dr. Parkes observes, we might take a lesson from the Russians in this respect.

Practical Hygiene, para. 142.

"The ration he thus alludes to contains, black bread, 1 lb.; meat, 1 lb.; Kawass, *i.e.*, fermented drink, 1.1 quart; sour cabbage, $3\frac{1}{2}$ gills; barley, $3\frac{1}{2}$ gills; salt, $1\frac{1}{2}$ oz.; horse radish, 4 grains; pepper, 4 grains; vinegar, $1\frac{1}{2}$ gills. All authorities agree that variety in the nature and description of food is absolutely necessary for the due maintenance of health; and that the necessity for this was acknowledged in India prior to the date of the Commissariat Commission is apparent. From the circumstances of the country, however, difficulties have ever existed in obtaining for the soldier that variety which at home and in the Colonies is readily available. The Commission had its attention specially drawn to this important matter, and among its recommendations that have received the sanction of Government is, that greater attention be paid to the variety of food, to the mode in which the men's meals are served up, and that messes be put upon a more becoming footing.

Paras. 300 to 305 of Commissariat Report.

A. G. to Military Secretary to Government, No. 97A, 23d September. Paras. 108 to 112 of Report.

"So long ago as 1860, the Commander-in-Chief expressed a desire that salt pork should be retained in store, so as not only to be available for issue, on occasions of the ordinary meat ration being condemned, but to afford the men an agreeable variety in their diet. The Commissariat Commission, however, did not support the recommendation, although evidently upon financial and not sanitary grounds.

Letter to Secretary to Government of India, No. 566, 6th August 1861, quoted in App. 2, to Presidency of Commissariat Commission.

"A scheme was in 1861 and 1862 laid before the Government of India by the Finance Department, the object of which was to show that changes in the diet of men might, without extra expense, be introduced, provided the Commanding Officer and Commissariat Officer were to make their arrangements in concert. In this way salt meat, fish, butter, cheese and condiments of different sorts might be supplied either directly by the Commissariat, or the money value of rations that men did not want might be made over to the regimental authorities for the purpose of being expended upon articles of food that were agreeable to the men.

G. O. C. C., 14th September.

"In 1863, the Commander-in-Chief, with the concurrence of Government, announced that arrangements might be made with Commissariat Officers for decreasing for a time the soldiers' ration of meat, when the Commanding and Medical Officers considered such a change necessary, and the sanction of his Excellency shall have been received for the arrangement being carried into effect. It does not appear, however, that, up to the time this paper is being written, this recommendation has been in any instance acted upon.

"The Commissariat Commission having the same object in view laid down what they deemed the best means of variety. This consisted in serving up on different days the dinners cooked in particular ways. Thus these meals would be as follows, namely:—

1st day, soup and boiled meat.

2d day, pies and curries.

3d day, baked joints with potatoes under them.

4th day, soup and meat salted with Carson's machine, dhall or peas pudding.

A. G. Circular, No. 75-81, 13th June.

"Very lengthy instructions in regard to cooking were published in 1863 by order of his Excellency the Commander-in-Chief. Among the recommendations therein contained are the establishment of regular messes among the men, and the appointment of soldier orderlies to superintend the cooking.

"Detailed instructions are also given in regard to how a variety of dishes are to be prepared. A bare enumeration of these dishes is all that can be given here, namely,—

a.—A ration of beef, onions, rice and pumpkins for 60 men.

b.—A ration of beef, onions, rice and sweet potatoes.

c.—A ration of beef, onions, and yams, with curry powder added.

d.—A ration of beef, rice, and yams, with pepper and flour.

e.—A ration of salt beef and yams.

f.—Salt pork.

g.—To

- g.—To boil greens or spinach.
- h.—To dress pumpkins and cucumbers.
- i.—To make tea and coffee on the line of march.
- j.—To make coffee.
- k.—To prepare soup.
- l.—To make a plain pudding.

“Regimental medical officers have from time to time recommended that in order to give variety to the diet of troops, the cooking be varied by haricot stews, salt ration, puddings of sago or arrowroot, and that, where fruits are obtainable, they have these in a dried or fresh state.

“There are few circumstances under which a good wholesome soup may not be prepared in India, and this, if it contain barley and vegetables, will always serve for a large portion of one meal, and, as observed by Sir George Ballingall, besides the various kinds of cabbage, carrots, turnips, &c., the produce of the garden, there are various kinds of cresses, sorrel, and other vegetables growing wild in the fields, which make no unwholesome or unpleasant additions to soup. Doubtless to select these would require a knowledge and great interest in the subject on the part of officers; yet that such a variety may be, under certain circumstances, obtained, is daily evinced by troops of the French army, and the medical history of the recent war in America indicates that such was also the case in that country.

Military surgery,
p. 40.

“The system of extra messing should, according to the suggestion of the Commission approved by Government, be encouraged, the sum so charged being laid out on the purchase of milk, puddings, fruit, cheese, spices, &c. These articles could, as in the case of the 35th Foot, be obtained from a morning market established in the vicinity of the barracks, and under the superintendence of the regimental authorities. In 1863 his Excellency the Commander in Chief issued instructions in regard to this subject, directing that orderlies be appointed from companies, as is the custom at home, and that the duties of these men shall be to purchase such articles of extra messing as will give the men considerable variety of diet, such as butter, milk, eggs, fowls, &c.

A. G. Circular,
13th June.

“It will be seen, from the foregoing remarks, that the means for improving the rations of the soldier in India have obtained the best consideration by the Government of India, and by his Excellency the Commander in Chief, and that in reality little if anything further is required than that the recommendations and orders laid down on the subject during the past year be carried out.

“The one great difficulty which for the present stands in the way is that of procuring, during several months of the year, a supply of the vegetables that soldiers would use. It is feared that some considerable time must elapse before this can be effectually removed, but, in the interim, much may be done by local arrangements to meet the difficulty. The rapid extension of railways may also be taken advantage of to convey vegetables to distances that were formerly impracticable, and although compressed or pickled vegetables are not a complete substitute for those in a fresh state, it is beyond doubt that they are very valuable adjuncts to diet, and as anti-scorbutics. Every endeavour should, therefore, be made to obtain a supply of them.

“At some stations, for example Mooltan, lime-juice has been issued with the greatest benefit during absence or scarcity of succulent vegetables, and similar good results would doubtless accrue at other stations, where vegetables are at times unprocurable.

“The following are the principal recommendations made by various authorities on the subject of improving the rations of soldiers in India, in regard to which action has already been taken, and the complete adoption of which is deemed desirable, viz. :—

1. That soldiers be encouraged to expend a small sum on extra messing, and orderlies appointed by companies, as at home, to purchase such articles as are likely to be relished.
2. That the responsibility for the quality of the rations rest entirely upon the commissariat officer.
3. The appointment of a non-commissioned officer to superintend the feeding of cattle and attending to the shambles.
4. That arrangements be made to enable the troops to have a cup of tea or coffee before going to parade.
5. That, as at present ordered, a small stock of groceries be kept on hand by regiments.
6. That the hours for meals continue as at present, viz., breakfast at 8½ A. M., dinner at 2½ P. M., and tea after evening parade.
7. That the bread be baked at all stations under commissariat agency; that flour be used, and proper yeast employed, the flour being ground in suitable mills, the dough kneaded by machinery, and proper bakeries erected.
8. That the cultivation of vegetables in gardens connected with gaols be as far as practicable carried into effect.
9. The encouragement among soldiers of cultivating vegetables, by paying them for such quantities as they raise, and by holding exhibitions.
10. That greater attention be paid to the manner in which soldiers' meals are served up, and that messes be put upon a proper footing.
11. Various rules have been laid down for cooking different kinds of dishes from the ordinary ration of the soldier, and such items of extra diet as are available to him; and these, if carried out, would doubtless afford him much of that variety which has been hitherto unobtainable.

“Various other recommendations have been made by the military authorities, by the

Commissariat Commission, and by officers of standing. Some of these have partly been acted upon; others have not been formally brought forward, or, if they have, do not seem to have attracted particular attention.

"Undoubtedly, however, their adoption would in some instances tend much to perfect the improvements in the rationing of the soldier, in so far as this is practicable. The points alluded to are as follow, viz:—

1. That properly fitted kitchens be erected, and suitable cooking vessels supplied.
2. That trained European cooks be appointed to regiments.
3. The recommendation, that arrangements be made for compressing or pickling vegetables, although it does not emanate from the Commissariat Commission, appears of great importance, and one which, if carried into effect, would be productive of very beneficial effects.
4. The issue to the soldier of an occasional ration of salt pork does not form one of the recommendations of the Commissariat Commission, yet the measure is one which on sanitary grounds commends itself.
5. The optional change of a certain portion of meat for an increased quantity of bread which, under certain circumstances, has been made practicable, has not apparently been taken advantage of by the soldiers. Hence there is reason to doubt if they feel the necessity for it.
6. As one of the most important ingredients of good soup is barley, soldiers ought to have facilities of obtaining it whenever they choose.
7. That fruits, dry or fresh, be allowed, wherever practicable, to the men.
8. That when vegetables, either fresh, preserved or pickled, are not procurable, the soldiers have the advantage of obtaining lime-juice."

Cooking.

65. There has been much difference of opinion regarding the plans of cook-houses that ought to be adopted for barracks and hospitals, and regarding the arrangements for cooking. A series of experiments has been ordered by the Government to be carried out, which, it is hoped, will afford the means of disposing satisfactorily of the whole subject. The provision of cook-room furniture on a fixed scale has been ordered. Although there is still much room for improvement in the cooking in this country, there can be no doubt that when regimental arrangements are good, the men are, upon the whole, better fed, so far, at any rate, as the quality and variety of cooking are concerned, than they are at home. This, however, only applies to the men in barracks. The cooking in the hospitals is very often unsatisfactory. The question is now under consideration of extending to all British regiments in India the system of appointing cook sergeants who have obtained the Aldershot certificate of qualification, and have undergone the prescribed probation.

Slaughter-houses.

66. The construction of proper slaughter-houses has been ordered at all stations for European troops, and the principles have been laid down by the Government according to which all slaughter-houses are to be in future constructed, or which are to be attended to in modifying existing buildings of the kind.

Sale of unwholesome food in cantonments.

67. The rules and regulations proposed by our Commission for the sanitary administration of military cantonments will, if they are put in force, give the means of enforcing all measures that are necessary for the prevention of the sale of unwholesome food in cantonments. They provide for the constant and vigilant inspection of all food and drink offered for sale, and for the seizure and destruction of all such food or drink as may be unfit for human consumption.

We have addressed the Government in a separate report regarding the necessity of preventing the sale of unwholesome pork, which, there is reason for supposing, is sometimes the cause of serious disease. The disgusting but common practice of deliberately feeding not only pigs but sheep and cattle upon filth of the worst description has been brought to the notice of the Government, and measures have been taken for preventing it in our cantonments and in places under the direct control of Government officers. These practices are an evident cause of danger. It has been conclusively proved by the researches of modern science that the serious diseases caused by the presence of *Tenia* or tape-worm, of *Trichina Spiralis*, and of other parasites, owe their origin to such causes as this. It has been proved in Europe that a large amount of formidable and fatal disease, presenting symptoms apparently similar to those of typhoid fever, and of other serious diseases, have been in reality due to the presence of *Trichina*. This dangerous parasite has been observed by Dr. Fayrer in a European patient in one of the Calcutta hospitals, and it has been suspected that it may have been the cause of serious disease which has been recorded under other names. The necessity of measures for the prevention of diseases of this class has been strongly insisted on in Europe, and there is no doubt that the filthy practices to which we have alluded render such measures still more necessary in India.

68. Other

68. Other subjects connected with the question of the food and drink supplied to the troops have been under consideration during the past year. Among these may be noticed the arrangements for supplying aerated drinks, such as soda water, lemonade, and ginger beer. The consumption of these is extremely large, and if care be not taken to supervise their preparation, they are sometimes very unwholesome. Measures have been proposed by which it is hoped that an ample supply of wholesome beverages of this kind may be provided for the soldiers at a cheap rate. The means for cooling water and other drinks are also very necessary. The use of machines for the manufacture of ice is gradually extending in India, and we may reasonably expect that these will before long be furnished at a price which will often make it possible to supply ice to the troops. One of these machines has been purchased by the Government, in order that an experiment with this object may be tried. Ice has already been supplied, to a considerable extent, to the regimental hospitals. We believe that nothing would have a more powerful effect in diminishing the consumption of spirituous liquors by the men in the hot season than the supply of iced water and aerated drinks. Ice in a tropical climate is not a mere luxury, and there can be no doubt that its use, which has greatly extended during the last twenty years, has been of great benefit to the health of those classes of the European community which have been able to obtain it.

Supply to the European troops of aerated drinks and ice.

69. It was recommended by the Royal Commission that the hospital diet tables in use at home stations should be adopted in India as far as practicable. This had already been done before the report of the Commission was issued. During the past year further improvements have been made, and the permanent adoption of the revised diet scales has been ordered. The new tables are more elaborate than those in force at home and in the Colonies. The arrangements in the hospitals in this country are certainly in many respects in an unsatisfactory condition, and they are for the most part very inferior to those which exist at home and in the Colonies. There is a deficiency of many things required for the comfort of the sick, and which are supplied in all civilised hospitals; the cooking is often very bad; and there are no properly trained attendants. The last subject is one of much importance, and it was specially noticed by the Royal Commission. On these matters we hope soon to submit a separate report to the Government.

Diet tables, cooking, and attendance in hospitals.

70. The Royal Commission noticed in its report the necessity of introducing female nurses into all large general hospitals in India.

Female nursing in general hospitals.

A satisfactory commencement in carrying this out has already been made. In the General Hospital, and in the Medical College Hospital in Calcutta, the two principal institutions of the kind in this Presidency, female nurses have been employed during the last four years with great benefit. They have supplied, to use the words of Dr. Chevers, a great want, and have been of inestimable value to the sick. These nurses have been under the management of the Calcutta Hospital Nurse Institution, a body supported principally by private subscriptions, with the assistance of a monthly contribution from the Government. The Sanitary Commission has been in communication, during the past year, with the committee of the institution with the object of determining the manner in which the advantages of female nursing in hospitals can be extended to the greatest practicable extent. We submitted to the Government of India the following general propositions:—1st. That in all large general hospitals maintained by the Government, the introduction of nursing by females is necessary; 2d. That whatever expense it is necessary to incur for this purpose, should be met as willingly as that of the other establishments organized for the care and treatment of the sick. The principles involved in those propositions have been admitted by the Government, and the Commission hopes to be able before long, with the assistance of the committee of the Calcutta Hospital Nurse Institution, and of the Medical Department, to submit a complete scheme for the orders of the Government. In this work the Commission will have the benefit of the advice of the highest living authority, Miss Nightingale.

During the past year another step has been taken towards the more general introduction of female nursing. The Government of India has sanctioned the provision of nurses for the female wards of all regimental hospitals, and it is hoped that plans may be devised for their proper training in combination with the scheme to which reference has just been made.

71. The organization of general hospitals at the principal European stations

Establishment of general hospitals at large stations.

was recommended by the Royal Commission. On this subject we propose to submit a separate report to the Government.

Supply of ambulances.

72. Another subject of importance which has lately been under the consideration of Government, and which may properly be noticed in this place, is the supply of ambulances for the transport of the sick. Hitherto these have been little used in India. The opinion has been generally expressed by the highest authorities that however advantageous it may be to supply ambulance waggons in addition to the doolees that are now allowed, it will only be on ordinary marches along good roads that it will be desirable to substitute ambulances for doolees as the means of transport for the sick. On an ordinary line of march there can be no doubt that a large proportion of the sick may conveniently and economically be carried in ambulances, but they cannot safely be depended upon for troops on field service. Ambulances are already supplied at most of the principal stations for the purpose of taking out convalescents in hospital for an airing. Elephants are frequently employed for the same object when the patients are able to bear the motion.

Rationing troops on board ship.

73. The system of rationing troops on board ship has been altered during the past year. The Admiralty scale of victualling for men, women, and children, in health, and for invalids, and of medical comforts, &c., laid down in Her Majesty's Regulations, has been adopted by the Government of India, with this modification, that no spirits are to be issued except under the orders of the officer in medical charge of the troops, porter being issued instead.* This has been the practice followed by the Government of India since 1859. A recommendation that this should be ordered was made in the Report of the Royal Commission under the erroneous impression that a different system was in force.

Reduction in amount of spirits issued from canteens.

74. One of the most important measures taken during the past year was the reduction of the amount of spirits issued daily to the soldiers from canteens. The former practice has been fully described in the Report of the Royal Commission. The following extracts show the reasons for which it has been followed, and the conclusions of the Royal Commission upon the subject:—

“According to existing regulations, every soldier has a right to purchase, at his regimental canteen, two drams of spirits of good quality, generally rum or arrack, supplied by the commissariat; or he may substitute malt liquor, wholly or partially, for spirit. The quantity of malt liquor issued in lieu of spirit varies in different regiments, but generally it appears to be a quart in lieu of a dram. * * * The whole tenor of the evidence goes to prove that the consumption of ardent spirits by the troops is a very potent cause of disease in India, and that much benefit to the efficiency of the Army would accrue from discontinuing its use, if it were practicable to do so. It is upon the practicability of effecting this great reform that the whole question turns. The use of spirits habitually is an acquired taste, which after a time becomes confirmed. The habit exists throughout the British army, and is carried with it to every station at which it serves, whatever may be the climate or its dangers. It is this depraved taste which lies at the root of the whole matter, and which renders it so difficult to deal with the question. * * * At most foreign stations, and throughout the whole of India, it has been considered advisable to permit the sale of ardent spirits, under restrictions as to quality and amount, in all canteens; because bad, adulterated, and, in some cases, poisonous spirits only could be otherwise obtained by the soldier. The permissive authorised sale of spirits, the use of which by the troops we have shown to be an indirect cause of a large amount of disease and mortality, thus becomes a direct encouragement to intemperance and disease, while its avowed object is to prevent disease by supplying men with a less injurious spirit than they could otherwise obtain.” The conclusion of the Royal Commission was, “that the sale of spirits at canteens should be discontinued, except in specific cases on the recommendation of the medical officer, and only malt liquor or light wines allowed; and that the sale of spirits in military bazaars be made illegal, and, as far as practicable, suppressed.” The opinion is, however, stated in the body of the report, that “any change would have to be gradually introduced, beginning with young soldiers, and discouraging to the utmost the use of spirits, until the stigma of spirit drinking be wiped off from the British army.”

Under

* Secretary Government of India, to Quartermaster General, No. 391, dated 25th July 1864.

Under the General Order issued by his Excellency the Commander in Chief, Sir Hugh Rose, on the 21st June 1864, the issue of rum from canteens was reduced from two drams to one dram daily per man. The time has not yet arrived at which we can form a judgment regarding the actual results of this change, but they can hardly fail to be ultimately beneficial, and it may be anticipated that these measures will be followed hereafter by others of a similar character. The cost to the State of this reform has been serious, because it involved the necessity of increasing the supply of malt liquor, which is furnished to the soldiers by the Government at a rate below the actual cost. In the Memorandum of the Accountant General, Military Department, dated 27th March, 1865, annexed to Sir Charles Trevelyan's Financial Statement for 1865-66, it is stated that "the increased consumption of malt liquor, chiefly caused by the reduction of the issue of spirits, involves an addition of no less than Rs. 22,87,861 (228,786 l.) in the cost of the liquor as landed at the several ports, and of Rs. 12,61,518 (126,151 l.) for local carriage and contingencies, making a total increase of Rs. 35,49,379 (354,937 l.)."

According to the Military Estimates for 1865-66, the total charges for malt liquor and spirits in the three Presidencies will be as follows:—

Malt liquor	-	-	-	-	-	-	-	£. 495,245
Spirits	-	-	-	-	-	-	-	48,327
Total	-	-	-	-	-	-	-	<u>£. 543,572</u>

75. Valuable statistics will, it is hoped, be obtained after the close of the present year, to show the comparative health and immunity from fatal disease enjoyed by the total abstainers from liquor, by the temperate, and by the intemperate, among the soldiers of the British army in the Bengal Presidency. Orders were issued by his Excellency the Commander in Chief, at the close of the last year, under which all commanding officers were instructed to keep up daily returns with this object.

Comparative health of temperate and intemperate soldiers.

76. The recommendation of the Royal Commission, that "the sale of spirits in military bazars should be made illegal, and, as far as practicable, suppressed," had been acted upon in all parts of this Presidency for many years before the recommendation was made, but the prevention of the unauthorised sale of spirits to the soldiers has always been a matter of great difficulty, in consequence of the constant demand for them that exists, and the large profits that are always to be made by supplying them. The law on the subject has been made still more stringent during the past year, by the enactment of Act XXII. of 1864. Severe penalties, including imprisonment and whipping, are laid down for the sale in any military cantonment, unless under the written license of the officer commanding, of any spirituous liquors or intoxicating drugs to or for the use of any European soldiers, or their wives, and this provision may be extended, at the discretion of the local government, to any limits around the cantonment. The mere possession of spirituous liquor in cantonments is, under certain circumstances, punishable. It is hoped that means may be found for carrying out the provisions of the law with greater stringency and success than has hitherto been found possible.

Sale of spirits in cantonments.

77. The Royal Commission has stated in its report that "the boots which at present are issued to the soldier do not fit well. They are made at home on a very few models and sizes, and when sent out to India are found in very many cases not to be wearable." We have addressed the Government separately upon this subject, with the object of ascertaining whether there is any ground for complaint on this account at the present time. So far as we have been able to learn, we believe that whatever may have been the case formerly, the boots that are now supplied are excellent. We have been informed by a distinguished officer, who has had the best possible opportunity of knowing the truth, that "there are no better boots in the world than those supplied by Government to the soldier in this Presidency."

Supply of boots to the troops.

78. During the last few years, the conservancy of barracks and hospitals in this Presidency has received much attention, and great improvements have been effected. All these have originated in the abolition of sewage drains, and in the substitution of the dry system, which consists in the immediate removal of all

Conservancy of barracks and hospitals.

filth in air-tight receptacles, and its burial at a distance from human habitations. Owing to the almost immediate commencement of putrefaction in the hot and rainy seasons, this is the only plan which has been found to be inoffensive. The system of dry conservancy, introduced by Dr. Hathaway into the Punjab gaols in 1852, was the application to the requirements of large bodies of men of the simple arrangements which had long been found to be perfectly successful in private life. Nothing could possibly be more satisfactory than the results obtained under this system in the gaols of the Punjab and of the North Western Provinces. Objection has been frequently made to it by persons who have not seen it in actual operation, but it may be confidently stated that under no system which has ever been followed in the most civilised countries have the results been more successful. When the system is properly carried out, there is perfect cleanliness, and entire absence of all nuisance. In December 1861, the Commander in Chief, impressed with the excellence of the arrangements which he had seen carried out in the central prison at Lahore, ordered their adoption in several military stations, and, in February 1863,* the system was extended to all our cantonments. Although there is still in many places great room for improvement, the conservancy of our cantonments is, generally speaking, incomparably more satisfactory than it was, and the just causes of complaint which existed a few years ago have, for the most part, been removed.

During the past year the system has been further developed by the introduction of the use of dry earth as a deodorizer, in the manner recommended by the Rev. H. Moule, in a paper read before the Society of Arts on the 5th May 1862. The general adoption of this plan was strongly recommended by the Indian Gaol Committee, after careful inquiry, and after complete practical proof had been obtained of its efficacy. The Sanitary Commission entirely concurred in these conclusions, and advised that the dry earth system should be tried upon a large scale. During the past year experiments have been carried on in nearly all the gaols and military stations between Peshawur and Singapore, and there is an almost complete concurrence of opinion that, when properly managed, its success has been most remarkable. We have deferred making a final report upon this subject, because additional expense will necessarily be incurred by the general introduction of the system, and we have been desirous of learning by full experience how the objects in view can be attained in the most economical manner.

The Royal Commission recommended that, "wherever practicable, iron or earthenware water latrines, supplied with water and drained to an outlet, be introduced instead of the present system; that where this is impracticable, all cess pits be abolished, and metal or earthenware vessels, to be removed twice a day, substituted." So far as the abolition of cess pits and the daily removal of filth is concerned, the recommendation has been fully carried out, but the introduction of a system of water latrines is a measure which we, in common with all Indian authorities, have found it impossible to support. The question is not one which it is necessary to discuss in this place. It is sufficient now to state that it is a question which has received our frequent consideration. There is, so far as we have been able to ascertain, no difference of opinion among those persons who have studied the subject in this country with the greatest care, and who by practical experience are best qualified to form a sound judgment regarding it, that the difficulties and objections in the way of carrying out the recommendation of the Royal Commission are insuperable.

79. There are a few other subjects noticed by the Royal Commission, which it is desirable to mention here.

The first recommendation of the Commission is, "that no recruit be sent to India under 21 years of age, nor until he has completed his drill at home; and that recruits be sent direct from home to India, so as to land there early in November." The latter part of this recommendation is sufficiently acted upon, for all troops, except under some special circumstances, now reach India in the cold season. The former part of the recommendation falls within the province of the home authorities, and we have been unable to learn whether it has been under their consideration.

80. The

* Quartermaster General's Circular, No. 227 B, dated 7th February 1863.

80. The recommendation of the Royal Commission,* “that until the mortality be reduced, the period of service in India be limited to ten years,” is in accordance with existing practice. Limitation of period of Indian service.

81. The recommendation† “that medical candidates be required to undergo the course of instruction, including military hygiene, at the Army Medical School” has been carried into effect. Instruction of medical and engineer officers in military hygiene.

With respect to the recommendation,‡ “that every cadet of engineers should attend a course of sanitary instruction at Chatham,” we have no information to show what has been done by the home authorities.

82. The recommendation, that § “in order to render available for India the experience obtained in dealing with all classes of sanitary questions in England, two officers of the Indian Government be appointed in England, to be associated with the War Office Commission for this special purpose,” has been carried out. War office commission.

83. The recommendation,|| “that the system of army medical statistics at present in use at home stations, be extended to all stations in India,” had been acted upon before the publication of the report of the Commission. Army Medical statistics.

84. An Act¶ which, it may be anticipated, will have an important influence upon the health of the troops, and of our cantonments generally, was passed by the Legislature in 1864. This law has made many changes in the system of administration which had previously been in force in military cantonments. Among other provisions, the local government has been authorised, with the sanction of the Government of India, to make rules and regulations for numerous matters of local importance, which, in places subject to the ordinary civil jurisdiction, would commonly be regulated by municipal bye-laws. These rules and regulations will provide for the following matters affecting the public health, safety, and convenience :— Act XXII. of 1864. rules and regulations for military cantonments.

For the detection and prohibition of public nuisances; for the maintenance, generally, of the cantonment in a proper sanitary condition; for the prevention and cure of disease; for the management and regulation of the public roads, of conservancy, and drainage; for the regulation and inspection of public and private necessities, urinals, cess-pools, drains, and all places in which filth or rubbish is deposited; of slaughter-houses, public markets, burial and burning grounds, and of all offensive or dangerous trades and occupations :

For inspecting and controlling houses of ill-fame, and for preventing the spread of venereal diseases :

For the supervision and regulation of public wells, tanks, springs, or other sources from which water is or may be made available for public use :

For the execution and promotion of works of public utility and convenience :

For the registration of deaths, and for making and recording observations and facts important for the public health and interests.

The Sanitary Commission has submitted to the local governments a draft of the general rules and regulations for matters affecting the public health, which it recommends for adoption under the Act in all military cantonments. It has also laid before the Government of India recommendations regarding many other subjects which appear to require regulation. The rules proposed by the Commission declare the general powers and responsibilities of the officer commanding the cantonment in matters affecting the public health; they provide for the appointment in every cantonment of a sanitary officer, and describe the duties which he is expected to perform; they carry out the recommendation of the Royal Commission that those parts of the new Medical Regulations of 7th October 1859, which define the sanitary duties of regimental, garrison, and inspecting medical officers, should be adopted to all Indian stations; they describe the means provided for carrying out measures necessary for the protection of the health of the troops and of the cantonment generally; and they embody

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* Recommendation 6.
§ Recommendation 36.

† Recommendation 33.
|| Recommendation 38.

‡ Recommendation 34.
Act XXII. of 1864.

those parts of the existing regulations of the Government which bear upon questions of sanitary administration.

The whole subject of the measures required for carrying into effect the provisions of Act XXII. of 1864 is under the consideration of the Government. When it is finally disposed of, a great step will have been taken towards the completion of the code of regulations for the Indian Sanitary Service, the preparation of which was recommended by the Royal Commission, and ordered by the Secretary of State for India.

Organisation of
general system of
sanitary adminis-
tration.

85. In the orders under which the Commission was constituted, we were directed to submit to the Government of India plans for carrying on and supervising a general system of sanitary administration throughout this Presidency, it being understood that the actual executive work must be carried out by the local governments and by the local civil and military authorities.

The organisation of such a system in the towns and districts in all parts of the country has engaged the attention of our Commission, and recommendations have been made to the Government of India on the subject. Even if we look no further than the protection of the health of the European soldiers, it will be evidently insufficient if we endeavour to improve the sanitary condition of our cantonments alone, and ignore the existence of the masses of the native population by which our troops are surrounded.

It is evidently neither expedient nor possible that the Government should undertake to carry out, generally, at its own expense, works of sanitary improvement in the towns and districts of India, and the costs of such works must ordinarily be borne by local and municipal funds. We believe that except in Bengal, for which province a new law was passed last year (Act III. of 1864, Bengal Council), known as the "District Municipal Improvement Act," which is likely to work satisfactorily, fresh legislation will be required to make it possible to enforce all the regulations necessary for the protection of the public health. We have recommended the establishment in all districts of local Boards for carrying on the municipal and sanitary service, the appointment of health officers, and the adoption of other measures for ensuring a proper supervision, throughout the country, of the sanitary condition of the people. The proposals that we have made are now under the consideration of the Government.

Registration of
deaths.

86. It was recommended by the Royal Commission, "that a system of registering deaths and the causes of death, be established in the large cities of India, and be gradually extended, so as to determine the effects of local causes on the mortality of the native as well as of the European population." The measures which have been taken for this purpose in Calcutta, have been noticed separately. In all the provinces of this Presidency, action has been taken in the matter. The local governments and administrations have generally considered that there will be no difficulty in making at least a beginning towards the introduction of registration, by means of the ordinary police and municipal establishments, and of the village putwarees. Arrangements have been made for giving effect to the proposed system. For some time to come the measures taken will be little more than experimental, but it is hoped that they will lead to the establishment hereafter, without expense to the Government, or vexation to the people, of a really useful registration of deaths.

Sickness and
mortality among
prisoners in gaols.

87. The only class of the native population for which any useful statistics of sickness and mortality are now available, is that of the prisoners in gaols. Unfortunately, however, in consequence of the imperfection of the method according to which prison statistics have hitherto been prepared, it is impossible for us to draw any clear conclusions regarding the actual mortality that has occurred. The returns throw no light upon the amount of sickness and mortality among the native population at large, nor can we make any comparison between the healthiness of the prisoners and of the native and European troops. We have addressed the Government separately on this subject, but it is desirable that we should also notice it here, lest the returns of the mortality in gaols, which are given in the Appendix to this Report, should be misunderstood.

In calculating the death rate in Indian prisons, the actual number of deaths is not distributed over the whole prison population, that is, the number of persons imprisoned during the year, but over the daily average strength, or the number derived from dividing the aggregate of the daily number of prisoners by the number of days in the year. This is, in fact, the same method which is applied in

in calculating the rates of mortality in the army. In the latter case, the results may usually be considered fairly comparable with those for the ordinary civil population, because, as a general rule, there is little alteration during the year in the strength and constitution of regiments. Even in the army, however, this general rule is not always true, and there can be no doubt that the same cause which operates in the case of the gaols, sometimes has the effect of greatly exaggerating the apparent rate of mortality among small bodies of soldiers.

The units which constitute the "daily average strength" in the calculations for the gaols, are not real, but imaginary men. To make up a daily average strength of 100 prisoners, 100 or 1,000 men may have been actually imprisoned. Thus, an "average man" (as he may be called), may have been one man who was imprisoned for 12 months, or two men for six months, or 12 men for one month, or 52 men for one week, or 365 men for one day. But in calculating the death rate, no importance is attached to this fact, and whatever number of men it may have taken to make up one unit of the daily average strength, each death is looked upon as that of one actual man. The exaggerating effect of the present method may be illustrated by an actual case, taken from the report on the gaols of the lower provinces for 1863. During the calendar year in one of the gaols, the actual number of persons imprisoned was 76; viz., 19 present on 1st January, and 57 admitted during the year. Among these 76 men, there were 21 deaths, consequently, the death rate calculated on the total prison population, was 27·6 per cent. But the average daily number of prisoners during the year was only 24, and there having been among this number 21 deaths, the death rate is recorded as 87·5 per cent. It will be seen that it might have been far less or far greater, according to the duration of the imprisonment, before expiry of sentence or death, of the 76 prisoners. In one sense, the figures resulting from this method of calculation are mathematically correct, but they hardly represent any fact that can be readily understood. We have proposed, in a separate report, that the opinion of the War Office Sanitary Commission be requested as to the best mode of calculating death rate in gaols, and we have made recommendations to the Government, with the object of obtaining in future sufficient data for an intelligent criticism of the real mortality.

It will, therefore, be understood that the returns of the sickness and mortality in the gaols given in the Appendix to this Report and in the following table are in reality in no way comparable to those of the European and native troops, and that the death rate resulting from the method of calculation that has been followed will convey to the mind, unless care be taken to appreciate its real significance, a very exaggerated idea of the mortality that has actually occurred. According to these returns, the rate of mortality in the gaols of the several provinces of this Presidency during the last four years has been as follows:—

TABLE XIX.

PROVINCE.	1861.				1862.				1863.				1864.			
	Average Strength.	Died per 1,000 of Average Strength.			Average Strength.	Died per 1,000 of Average Strength.			Average Strength.	Died per 1,000 of Average Strength.			Average Strength.	Died per 1,000 of Average Strength.		
		Cholera.	Gaol Fever.	All Causes.		Cholera.	Gaol Fever.	All Causes.		Cholera.	Gaol Fever.	All Causes.		Cholera.	Gaol Fever.	All Causes.
Bengal Proper and Assam.	13,924	13·2	—	87·7	14,692	9·9	—	78·6	15,097	20·2	—	92·7	14,441	17·3	—	66·4
Benares, Oudh, Eastern Doab, and Bundelkhund.	11,398	11·8	—	76·1	13,975	·8	—	51·3	14,664	23·9	—	97·7	15,450	8·2	—	67·1
Pooree and Central India.	5,089	2·4	—	34·0	5,316	4·7	—	39·7	4,975	10·1	7·8	73·4	5,448	11·6	—	51·4
Milkhund, Meerut, and Agra.	9,669	44·3	51·0	183·7	8,534	2·0	46·6	97·0	8,043	5·7	41·4	82·8	7,641	—	—	73·8
Punjab - - -	10,385	4·4	29·2	81·6	10,354	9·0	18·5	59·7	9,632	—	21·4	66·0	9,630	·1	—	86·2
Bengal Presidency -	50,915	15·2	16·1	96·7	52,871	5·5	11·2	66·8	52,401	14·3	11·7	85·8	52,598	8·4	*	69·8

* Returns of Gaol Fever in 1864 not received.

High rate of
mortality in gaols.
Typhus fever.

88. Although, as we have stated, these death rates are not comparable with those prevailing in the army, or among the free population, and although they give an exaggerated representation of the real mortality, there can be no doubt whatever that the mortality has been excessively high. Cholera and typhus fever have in particular been most fatal. In illustration of the excessive virulence of the latter disease, we may quote the case of the Agra gaol, in which, during the three months of March, April and May 1864, with an average strength of about 2,400 prisoners, 1,340 prisoners were attacked and 250 died. Other instances could easily be given in which the mortality has been little if at all inferior.

We have addressed the Government on several occasions regarding the mortality in Indian gaols, and it is not necessary that we should now enter into this question in detail. It is desirable, however, to notice that the subject of the condition of prisoners and of gaol discipline has been carefully considered during the past year. Early in 1864, a Special Committee was appointed to report upon the whole subject, and their recommendations have been laid before the Government.

We can hardly speak too highly, in many respects, of the constant care which has been given for some years past to the prisoners in our gaols, especially in the North-Western Provinces and in the Punjab, where better buildings generally exist than in Bengal. It would be difficult, more particularly in the larger or central prisons, to surpass the excellence of the conservancy arrangements; the food and clothing of the prisoners have ordinarily been far better than those of the lower classes of the free population, and the amount of labour exacted has been moderate. In spite of all this care, the mortality has been excessive, and we believe that this must be chiefly accounted for by the fact that the prisoners have, as a general rule, been over-crowded. This evil has more than counteracted all the efforts that have been made to improve the sanitary condition of our gaols, and it is one that has gone on increasing with the increase in the number of criminals and with the development of the system under which all prisoners sentenced to labour are employed in manufactures and other useful occupations within the walls of the gaol. It is only during the last few years that typhus fever of a most virulent and contagious character has attacked the gaols in Northern India, and this formidable disease has shown very strongly the dangers that follow upon over-crowding. We do not mean to say that this fever, or cholera, or any other serious epidemic disease, is actually caused by over-crowding, or indeed by any sanitary defects, however great. All that can be said is, that when, through some cause of which we are ignorant, diseases of this kind appear in over-crowded or otherwise unwholesome localities, they find the conditions most favourable for their propagation.

We have on several occasions addressed the Government on the subject of this fever, more especially with reference to the possibility of its attacking the European soldiers. We think that the attention of medical and other officers cannot be too strongly and constantly given to the necessity of taking every possible precaution for the protection of the European troops against this formidable disease. We fear that we have no right to assume that this is an imaginary danger, although the improvement in the sanitary state of barracks and hospitals, and of our cantonments generally, has been so great that we may hope that the conditions under which the European soldiers now live are not favourable to the propagation of such a disease as this.

Epidemic fever in
Bengal.

89. This fever has been by no means peculiar to the gaols, but has attacked the general population in many districts of the Upper Provinces with great virulence. It has been supposed by some authorities that it may be connected with the epidemic fever which has lately proved so extremely fatal in some of the districts of Bengal. This, however, remains in doubt. Early in 1864, a Special Commission was appointed by the Government of Bengal for the purpose of investigating this epidemic fever. The Report of the Commission gives a lamentable account of the ravages of the disease in the districts of Burdwan, Hooghly, Nuddea, and the 24 pergunnahs. This fever, although apparently not really a new disease, has only attracted special attention during the last few years. There is nothing to show the fatal mortality caused by it, but in many places it has been fatal to an extent which would be almost incredible if the facts were less completely established. The following statement is extracted from the Report of the Commission of Inquiry, para. 38 :—“ Many large *baries*, in which there were formerly 30 or 40 residents, have now been left with perhaps one solitary

solitary occupant; whole mohullas and streets have been deserted, and large villages which formerly told their residents by thousands, can now almost number them by hundreds. The total population of Oollah was stated to have been 18,000 to 20,000 before it was attacked, and it was calculated that at least 12,000 of these had fallen victims within six years. The village of Sreenugger has been almost depopulated. At Culna three-fourths of the inhabitants have been carried off. Upon the whole, we believe that about 30 per cent. of the whole population of the infected area have died."

In the orders of the Government of Bengal passed upon the Report of the Commission of Inquiry, the following account is given of the common condition of the villages of this part of Bengal* :—

"The surface of the land within the village is covered with low jungle. The villages are laid out on no plan, and without any reference to conservancy arrangements. The houses or huts are built of earth taken from a hole close by, which becomes a receptacle for all kinds of filth. All ventilation is kept out by the hedge of jungle with which every hut or collection of huts is surrounded. Filth is deposited indiscriminately in the nearest available spot. There are no public or private necessaries, and the people resort to the jungles and open fields in the neighbourhood of their houses. The houses are unventilated and overcrowded; the poorer classes sleep on mats on the raised mud floor, sometimes not more than a foot from the ground; and from the brick houses in which the better classes reside, the filth is allowed to trickle through some opening on the floor and brick-work, and to lie beneath the walls. The tanks near the villages are used indiscriminately for bathing, washing, cooking and drinking purposes, and being also used as receptacles for all kinds of refuse and filth, the water they contain is unfit for domestic purposes." "In the Mahomedan quarters of villages" (we quote from the Report of the Commission) "the dead are constantly buried on the very borders of the tanks. Here and there cemeteries are to be found, but even in those places they are not exclusively resorted to. Graves may be seen scattered about in every direction, and these graves are seldom made sufficiently deep to ensure the people against poisonous exhalations from the interred bodies. The bodies lie so near the surface that sometimes, as is well known, they are disinterred by jackals and dogs. The Hindoos, in ordinary times, pretend to burn their dead; but even at such times only a few bodies are effectually destroyed. In most cases the half-burnt remains are left to be devoured by birds and animals, and many bodies are simply thrown away without funeral rites of any kind into nullahs and rivers. In times of great mortality, Hindoos and Mussulmans alike abandon all attempt to dispose of their dead with respect and decency, and bodies are recklessly thrown out in all directions, poisoning the air for miles with the foulest effluvia."

The Commission of Inquiry recorded its opinion that the main causes of the fatal fever which has prevailed are miasm, polluted drinking water, vitiated air, and deficient ventilation, excessive use of farinaceous food, and, to a slight extent, contagion. Although we are not prepared to agree altogether in these conclusions, believing, as we do, that it is far more probable that the disease has its origin in a certain specific poison propagated from man to man, than that it is produced by any sanitary conditions, however unfavourable, we have been unable to suggest any practical measures, in addition to those which have been recommended by the Commission, and adopted by the Government of Bengal. Whatever be the origin of the disease, or the manner in which it spreads, we may conclude with certainty that it finds the best possible conditions for its propagation in the horrible and almost incredible filth in the midst of which the people live. We have described elsewhere the state of Calcutta, the capital city of these same Bengalees, and have declared that no parallel to its filthiness can be found in any other part of India with which we have any acquaintance. It will be seen from the foregoing extracts, from the orders of Government, and from the Report of the Commission of Inquiry, that the state of the people in the town is more than equalled by that of the people in the country. We find, too, in the country as in the town, that the difficulties of contending against these great evils are aggravated, to an incalculable extent, by the utter apathy of the better classes of the community. "The sympathies of the wealthier classes" (write the Commissioners) "have been, to a very slight degree, enlisted in
favour

* Letter, No. 1479 T, dated 12th July 1864, from Secretary to Government of Bengal, to President of the Commission of Enquiry on the Epidemic Fever.

favour of their poorer neighbours. Indeed, in most places, the efforts made by the zemindars, and other well-to-do people in the Mofussil, to assist their ryots, may be, without injustice, described as *nil*. It is to be feared that, in some instances, where collections of money have been made to defray the expense of sanitary improvements, contributions have been extorted from those who were ill able to pay them, while the richer inhabitants put their names down in the subscription list for sums, of the insignificance of which they ought to be ashamed, and the full amounts of which they did not, in point of fact, subsequently pay up. These remarks must not, indeed be considered of universal application. Some exceptions stand out in pleasing relief."

The Government of Bengal has taken such measures as were in its power to reverse or mitigate the worst of the sanitary evils that have been described, and the enactment of the "District Municipal Improvement Act," which has been noticed elsewhere, will greatly increase the means of action at the disposal of the authorities. But the complete removal of these evils is a work far beyond the powers of any Government. Liberal assistance has been promised by the Government in the execution of any works of obvious advantage which may be immediately undertaken with benefit to the public health. It has been asserted that the construction of railways and roads has aggravated the sickness by intercepting the drainage. A special inquiry is in progress, with the view of ascertaining the extent to which the drainage of the country has really been interfered with, and of showing what measures ought to be adopted for its improvement.

Act for the
prohibition of
inoculation in
Calcutta.
Vaccination.

90. At the commencement of the present year, an Act (No. IV. of 1865) was passed by the Bengal Legislature for the prohibition of the practice of inoculation in the town and suburbs of Calcutta. The Act may be extended to other places under certain conditions, when it appears to the Lieutenant Governor of Bengal that sufficient arrangements have been made for the protection of the inhabitants by vaccination. Under this Act any person performing inoculation is liable to imprisonment for three months, or to a fine of 200 rupees, and the same penalties are laid down against any person who, having been inoculated, shall enter any place in which the Act is in force, until 40 days have elapsed from the date of inoculation, or without a certificate from a qualified medical officer that such person is no longer likely to cause contagion. The reasons for this enactment are given in the preamble, as follows: "Whereas it is found that small-pox is spread by inoculators who infect persons living in towns without adopting any precaution against contagion: and whereas proper and sufficient arrangements have been made in the town of Calcutta and in its suburbs, and in certain other towns in the province of Bengal, for the vaccination or inoculation with the cow-pox of the inhabitants thereof respectively; and it is desirable to prohibit by law the practice of inoculation with the small-pox in such towns and places; it is enacted as follows:" &c. &c.

No reference having been made to the Sanitary Commission on the subject of this Act, our knowledge of the reasons for which it was considered expedient, is altogether imperfect. We therefore do not wish, at present, to give any opinion regarding the propriety of the measures that have been adopted. But we think that very careful consideration ought to be given to the question before this Act is extended to other places. We have been informed, on very high authority, that it may be estimated that 85 per cent. of the Hindoo population in Calcutta, and its neighbourhood were protected by inoculation before this Act was passed. The people generally utterly disbelieve in the efficacy of vaccination, and whatever may be the case in Calcutta, there can be no doubt that in most other parts of the country this disbelief has been completely justifiable, because the vaccination that has ordinarily been afforded has been worse than useless. Our reasons for this belief have been given in a separate report. In the hill province of Gurhwal, the result of the admirable measures of Dr. Pearson has been that the whole population has been protected against small-pox by vaccination, and inoculation has almost ceased, not because it has been prohibited, but because the people have become convinced of the superiority of vaccination. But in the cool climate of the hills vaccination can be carried on almost throughout the year; the population is scanty, and having learned by experience the advantages of vaccination, the people are not only willing but eager to obtain them. In the plains of India, on the other hand, vaccination can usually only be practised with success during the

the cold season. If, as Dr. Pearson has shown, the people can be taught to believe in the efficacy of vaccination, they will themselves adopt the practice, but it is visionary to suppose that the Government can, by its own action, protect by vaccination more than a hundred millions of people. We do not overlook the fact that the practice of inoculation may lead to the introduction of small-pox into places which would otherwise have been free from the disease, nor do we deny that, under certain circumstances, its prohibition by law may be not only proper, but necessary. We do not doubt, for example, that such prohibition ought to be enforced at the present time in England. But whether, under the circumstances which now exist in those parts of India in which inoculation has been commonly practised, any prohibition of the kind is desirable, appears to be very questionable.

91. In the orders under which this Commission was constituted, the improvement of the sanitary state of the city of Calcutta was specially noticed as a matter of pressing importance, and this was one of the first subjects which came under our consideration. In a Minute, dated the 5th March 1864, the President of the Commission gave a sketch of the sanitary state of the northern or native division of the town. He stated that in the filthiest quarters of the filthiest towns that he had ever seen in other parts of India or in other countries, he had never seen any thing to be compared with the filthiness of Calcutta, and that this was true, not only of the parts of the city inhabited by the poorer classes, but of the quarters filled with the houses of the richest and most influential portion of the native community. He stated that the condition of the river upon the banks of which Calcutta stands was as abominable as that of the city itself; that 5,000 human corpses had been every year thrown from Calcutta into the river, which supplies the greater part of the inhabitants with water for all domestic purposes, and that 1,500 corpses had been thrown into the river in one year from the Government hospitals alone. Mr. Strachey declared the state of the capital of British India, one of the greatest and wealthiest cities in the world, to be a scandal and a disgrace to a civilized government.

If the language used by the President of this Commission, in describing the filthy condition of the native quarter of Calcutta, had been still stronger, it would not have been misplaced. Evidence of this assertion may be found in every page of the report of the health officer of the municipality for the past year. The greater part of that report consists of descriptions of perhaps the most abominable series of nuisances that were ever allowed to grow up in the principal city of a civilized government. The efforts of the municipality and of their energetic health officer, Dr. Tonnerre, to improve matters have not been fruitless, but the difficulties to be contended against have been excessive. Among these difficulties not the least serious are those caused by the indifference or passive resistance to all improvement on the part of the upper classes of the native community. In other countries, and even in other parts of India, it is only the lowest and poorest section of the community that is content to live in the midst of nuisances and filth. This is not the case in Calcutta. "The most respectable and wealthy of the natives," writes the health officer, "inhabit the second and third divisions, and yet the nuisances are more numerous and worse than in any other district. * * I have no words to describe the nuisances which I have discovered in some places, chiefly in the neighbourhood of Burra Bazar. As it was impossible to find out some of the most abominable nuisances without trespassing on private grounds, offenders had hitherto enjoyed an impunity which had rendered them more and more indifferent to the most common principles of cleanliness and decency. * * The police records will show that the most numerous and heaviest fines were inflicted upon some of the wealthiest natives in the above localities. The drains in that part of the town, though cleared every day, are most disgusting owing to the immense quantity of offensive matter which is let off daily into them from the houses. * * No nuisances in the other divisions ever equalled those I discovered in some places in this.† Any fine below the maximum fixed by the Act is of no effect, as the accumulation of filth is so great in some of these places that the parties prefer paying the fines to clearing their premises, which would require considerable labour and great expenditure of money."* These facts

† Health Officer's First Annual Report, 1865, page 6.

facts serve to show how great are the difficulties with which the work of sanitary improvement in Calcutta has to contend. It may be added that there could hardly be found a better illustration of the truth of the assertion made by the President of our Commission in the Minute to which reference has been already made, that in such a state of society as this of Calcutta, a system of administration, based upon the model of English municipal institutions, must be unsuitable and inefficient.

Sanitary improvements carried out in Calcutta.

92. It would, however, be most unjust to say that there has been no improvement during the past year. On the contrary, although matters are still, in some respects, almost as bad as ever, very great progress has been made.

Throwing dead bodies into the river.
Burning ghats.

93. The practice of throwing the dead bodies of men and animals from the city into the river has been entirely stopped. The hospitals and prisons of the Government no longer dispose of their dead in this shameful manner, and the bodies of all Hindoo paupers are burned at the expense of the municipality. This great reform has been effected without the slightest difficulty or opposition of any kind, and at a trifling expense. The question which arose during the earlier part of the past year regarding the proposed removal from Calcutta of the places set apart for burning the dead to situations outside the city, is only noticed here because it created at the time considerable interest and led to much discussion. A most exaggerated importance was given to the subject, not, however, by the native community, for the notion, that the Hindoos looked with apprehension upon the action taken by the Government as an attack upon their religion, had no foundation. The municipality of Calcutta was allowed by the Government of Bengal to dispose of the question in its own way. That the practice of burning the dead in the midst of the city is indecent and objectionable is evident to every Englishman, and in almost any other part of India but Calcutta this would be the opinion of the better classes of the native community. Looking upon the matter, however, as one that concerns the public health, it has little real importance, and measures are being carried out by the municipality which will probably remove all objection of this kind.

Sanitary survey of Calcutta, and suppression of nuisances.

94. During the year a sanitary survey of the whole town was made by the health officer, Dr. Tonnerre, with the object of carrying into immediate execution the most urgent reforms, and of ascertaining the best mode of suppressing the more common nuisances. The drains and sewers of the town, which were choked up with the accumulated filth of many years, have been cleared out. The amount of filth and silt, and rubbish, is enormous that has been thus removed from many parts of the town. Some of the most important drains had become altogether obliterated, with this result, that during the rainy season a considerable part of the most populous and wealthy quarters of the town was often under water. These have been re-opened, and the benefit will be great.

Many offensive trades and occupations which caused insufferable and dangerous nuisances, have, for the first time, been banished from the interior of the city. The practices which the health officer discovered, and which have now been stopped, were most abominable. Measures have also been taken for the regulation of the public latrines, and although these are still, in many cases, disgusting nuisances, they are not so bad as they used to be.

One hundred urinals are in course of construction in the principal thoroughfares. They will, it is hoped, be kept in good order, and means of deodorising them will be provided. It may be anticipated, as the health officer has observed, that the erection of these buildings will not only improve the sanitary condition of the streets, but will make it possible to enforce common rules of decency, which are now totally disregarded.

Conservancy of Calcutta.

95. In the Conservancy Department the establishments have been largely increased. The refuse of the town is now carted away from the streets daily, instead of being left exposed for days or weeks; the offal which was formerly thrown into tanks and holes within the town, or into the river, and the carcasses of animals, are now taken away daily to a distance of three miles and burned in a kiln, without any offensive odour, thus, as the health officer says, "freeing the town from one of its most noxious and disgraceful nuisances." A still greater improvement has been undertaken and partially carried out in the removal of the night soil, the greater portion of which formerly found its way into the open drains of the streets. This will be taken to waste ground at a distance of
three

three miles beyond the eastern boundary of the town, and there buried, and arrangements have been made for removing the filth in air-tight vessels, so that no nuisance shall be caused. The destruction caused by the hurricane in October caused delay in carrying out the new scheme of operations, but it has already been partly introduced, and it is hoped that before the coming rainy season the practice of throwing night soil into the river will have altogether ceased. The municipality has further made arrangements for constructing a railway for conservancy purposes. This is now in progress, and it will greatly facilitate the task of getting rid of the filth and rubbish of the town.

96. It may properly be noticed here that the great drainage and sewerage works of Calcutta have made good progress during the year. It is hoped that it will be possible, before very long, to bring into use a considerable portion of the new system, and better means will then be afforded than any which now exist of judging how far this great and costly undertaking is likely to prove successful. The time has past for criticising these works. They have now made such progress that they must clearly be carried on to completion, and we can only hope that the fears expressed by many high authorities will be shown by experience to have been unfounded, and that this great system of drainage will prove, as some anticipate, a remedy for the most serious of the present sanitary evils of Calcutta.

Drainage and sewerage works in Calcutta.

97. The sale of unwholesome food and drink in Calcutta has been the subject or much consideration during the past year. The inquiries of Dr. Chevers and of other officers have shown that there is reason for believing that much of the liquor sold in Calcutta is adulterated and drugged to a dangerous extent, and that the European sailors and soldiers are among the chief sufferers from these practices. The sale of food unfit for human consumption has also been, undoubtedly, very common. Measures have, for the first time, been taken during the past year for dealing with this important subject. A special establishment has been appointed with the object of enabling the health officer to carry out the systematic inspection of food and drink exposed for sale in shops and public markets, and to ensure the seizure of unwholesome articles. Large quantities of food and drink, unfit for consumption, have been confiscated since these measures were commenced, and although much remains to be done, there can be no doubt that much good has been effected.

Sale of unwholesome food and drink.

98. The disgusting condition of the slaughter-houses from which all the meat consumed in Calcutta is supplied, was brought prominently to the notice of the Government of Bengal by the Sanitary Commission in March 1864. Not a single properly regulated slaughter-house exists, and nothing could possibly be more filthy and revolting than their condition when we inspected them. It is satisfactory to be able to report that measures have been taken which, it is hoped, will lead to the speedy and complete removal of one of the worst of the sanitary evils of Calcutta. The municipality has undertaken to construct at once a large public slaughter-house in the suburbs of Calcutta, according to approved European models, and to carry on the management by means of its own servants. The existing law, not providing the necessary powers for the proper superintendence and regulation of such establishments, an Act (No. VII. of 1865) has been passed by the Bengal Council for this purpose. This Act prohibits the use in the suburbs of Calcutta of any unlicensed slaughter-house; it provides for the adoption, in all cases, of proper conservancy arrangements; for making bye-laws for the management and inspection of slaughter houses and markets; and for the seizure of unwholesome meat or fish. The provisions of this Act may be extended to other places in Bengal, and there can be no doubt that they will prove extremely useful.

Calcutta Slaughter-houses.

99. Another measure of the very first importance to the public health has at last, after many years of fruitless discussion, reached a point at which we may reasonably hope that we are about to obtain an actual result. We refer to the scheme which has been matured by Mr. Clarke, the Engineer of the Municipality, for supplying the City of Calcutta with water, at an estimated cost of more than 600,000*l*. The municipality has declared that it is able and ready to commence immediately the execution of the plan, and although the propositions that have been made have not, so far as we are informed, been finally sanctioned by the Government of Bengal, and although in some respects the

Calcutta water supply.

projects may possibly receive considerable modification, it may be expected that action of some kind will soon be taken.* Of all the measures that are required for the improvement of Calcutta, the provision of an ample supply of water is perhaps the most important. It is not necessary that we should now describe in detail the project which has been adopted by the municipality. The source of supply will be the Hooghly at Pulta, about 14 miles above Calcutta, and, after being passed through filtering beds, the water will be conveyed in a covered channel to all parts of the city. It is much to be regretted that the quality of the water at Pulta is not more satisfactory, and our Commission very unwillingly accepted the conclusion that no other source of supply is practicable. A reference has lately been made to the Home Government at our suggestion, with the object of obtaining the opinion of the War Office Sanitary Commission regarding the methods of filtration which ought to be adopted.

Prevalence of
small-pox.

100. Towards the end of 1864, and during the earlier months of the present year, small-pox was excessively prevalent in Calcutta, and there has been an epidemic of this disease over a great part of the Bengal Presidency. A small-pox hospital was established in Calcutta, and proved very useful. Dr. Chuckerbutty, who had the management of the hospital, has given an interesting account of the facts observed. Between the 23d December 1864 and 13th April 1865, 627 persons were admitted into the hospital. Of these, 354 were unprotected by inoculation or vaccination, and among them there were 185 deaths, or 52 per cent. One hundred and sixty persons were admitted after previous vaccination, and among them 43 died, or 29 per cent.; among 12 of these admissions in which vaccination had been twice performed, there were no deaths. Sixty-five persons were admitted after inoculation, and among them 20 died, or 30 per cent. "This result," writes Dr. Chuckerbutty, "obtained in a country where inoculation has been the rule, and vaccination the exception, is a most significant fact. The diminution of the risk is greater from inoculation than vaccination, and the popular belief in this case is perfectly correct."

The establishment of the Small-pox Hospital in Calcutta was followed by another useful measure, the provision, at each of the police stations, of means of conveying to hospital persons suffering from small-pox and other contagious diseases, and the issue of orders to the police prohibiting them from supplying any public conveyance for such purposes.

Calcutta gaols.

01. The state of the Calcutta Gaol and House of Correction formed the subject of a special report to the Government during the past year. These gaols were certainly the filthiest and the worst managed of any that could be found on this side of India. We need not now repeat the account that was formerly given of them. It is sufficient to state that great improvements have been carried out, and that an Act of the Legislature has given to the Government of Bengal the power, which it did not possess before, of establishing in these gaols a proper system of management and supervision.

Calcutta police
hospital.

102. A worse scandal than the condition of the Calcutta Gaol was that of the Police Hospital. The state of filth in which the buildings of this institution were found at the beginning of the past year was shameful, and the accounts that have been given of the mismanagement and actual cruelty that went on would hardly be credible were the evidence less conclusive. It would be difficult to find a more discreditable history than that of the Police Hospital of Calcutta, which the Sanitary Commission had to report last year to the Government. Matters have long ago been placed on a more satisfactory footing, and the erection of a new Hospital, instead of the present inconvenient and unsuitable buildings, has been ordered.

Hospitals in
Calcutta.

103. The other hospitals of Calcutta have, we need hardly say, been managed very differently. But, as Dr. Fayrer has justly observed, however excellent may be the medical care and supervision afforded, every hospital in Calcutta is defective in the most important essentials of arrangement and construction. "The hospitals of Calcutta," he writes, "were built before hospital construction had received the scientific consideration to which it has been deemed entitled

* We understand that, since this was written, the project has been sanctioned by the Government of Bengal.

entitled of late years, and though we have more than one noble institution, we cannot strictly be said to have really one good hospital.”*

We have noticed elsewhere the arrangements that have been made for introducing female nursing into the Calcutta Hospitals, and the plans which are now under consideration for the further extension of the system.

104. A Chair of Hygiène was established during the past year in connection with the Calcutta Medical College, and the Secretary to the Sanitary Commission was appointed to be the first Professor. Lectures on many subjects affecting the public health were delivered during the season. Establishment of
Chair of Hygiène.

105. The registration of births and deaths has been established in Calcutta during the past year. Considering the novelty of the system and the ignorance of the people, no great accuracy of registration could at first be expected. The returns of births have hitherto been of little value, and those of deaths probably exhibit no great approximation to the truth. A good beginning has however been made, and there is no reason for doubting that the returns will go on improving in value. Their utility will not properly be felt so long as there is no census of the population of the town. The estimates of population that have been made during the last 50 years have varied from 200,000 to 700,000, and there is nothing to show the real number of inhabitants. The best authorities at present consider that the population is about 400,000 or 500,000. It is hoped that the want of a census will be supplied during the present year. In the present state of ignorance it is useless to attempt to estimate the actual rate of mortality in Calcutta among any class of the population. Even, however, in their present imperfect state, the returns possess considerable interest. The following Table is taken from them. The figures show the number of deaths from various causes recorded during the last nine months of 1864:— Registration of
births and deaths
in Calcutta.

RELIGION.	All Causes.		Small Pox.		Dysentery.		Diarrhoea.		Cholera.		Fever.		Phthisis.		Hepatitis.	
	Male.	Female.	Male.	Female.	Male.	Female.	Male.	Female.	Male.	Female.	Male.	Female.	Male.	Female.	Male.	Female.
Christians -	302	219	12	13	23	16	6	17	92	29	28	23	19	11	5	-
Hindoos -	4,671	3,047	221	189	594	522	104	161	1,562	615	1,131	763	147	81	3	2
Mahomedans -	1,778	982	84	83	223	158	19	29	515	162	568	338	61	31	-	-

106. More than 80 per cent. of the recorded deaths were caused by zymotic diseases. Cholera, dysentery, and fever were the most fatal. No less than 23 per cent. of the deaths among Christians, 28 per cent. among Hindoos, and 25 per cent. among Mahomedans were due to Cholera. Nor was this any peculiarity of the past year. The inquiries of Dr. Hugh Macpherson have shown that during the 20 years ending with 1860, cholera had never been absent from Calcutta. “It reaches,” says the report of the Cholera Commission, “its lowest point in August, when about 150 out of every 1,000 deaths among the native population are attributable to it. It then gradually rises through the autumn and winter, reaches its climax in April, and then again falls regularly until August. When the disease is at its highest point of intensity, it causes every year more than half of the total number of deaths.” Mortality from
cholera in
Calcutta.

These facts and figures, however, do not, so far as we are able to judge, give a correct representation of the average mortality for cholera among the fixed European population of Calcutta. The report of the Cholera Commission, basing its conclusions on Dr. Hugh Macpherson’s researches, states that “in the five years ending with 1860, there were 716 deaths from cholera among the European Protestant population. This was one-fourth of the deaths recorded from all causes; of these 716 deaths, 76 per cent. occurred among the floating population, consisting chiefly of sailors visiting the port. * * In the five years in question, out of a total number of 1,170 deaths from all causes among the European

* Surgery in Bengal : An Address to the Bengal Branch of the British Medical Association, 1865, p. 10.

European floating population, no less than 46 per cent. occurred from cholera, while among the resident male population, out of a total number of 822 deaths, only 13·7 were due to that cause."

Mortality among
sailors in Calcutta.

107. The Commission has frequently, during the past year, had occasion to notice the excessive mortality among the sailors in the port of Calcutta, and it has addressed the municipality and the Government of Bengal on the subject. Although there is ample evidence to show that the rate of mortality is very high, there are no available statistics in which complete confidence can be placed. We have pointed out the great importance of supplying this want, and we believe that there need be no difficulty whatever in causing proper registers to be maintained, which should at all times show the number of sailors in the port, and the mortality that occurs among them. The almost total absence of means for protecting the lives and health of European sailors in Calcutta, is, at the present time, very greatly to be regretted. There are practical difficulties to be overcome before an effectual remedy will be applied to existing evils, but there is no reason why they should be considered insuperable. Our Commission hopes that it may be able before long to make further recommendations to the Government on this subject.

Great sanitary
improvement
carried out in
Calcutta in 1864.

108. We think that it will be evident from the foregoing account, that however serious may be the evils which remain, there has been great progress made in carrying out sanitary improvements during the past year in Calcutta. Among the causes which have promoted this result, not the least important has been the adoption of a measure which was formerly recommended by our Commission, the appointment of the chairman of the municipality to be also the head of the police establishments. This has provided a stronger executive authority than before existed, and the old and mischievous antagonism between the municipal and police authorities has been got rid of. Other measures recommended by the Commission have also been authorised by special legislation for increasing the power of the local magistrates in dealing summarily with offences affecting the public health and convenience, and in preventing nuisances. It is one of the signs of the increased vigour of administration, that whereas in 1863 the total amount of fines paid through the police to the municipality did not exceed 5,000 rupees, the amount in 1864, on account of the Conservancy Department alone, was upwards of 30,000 rupees.*

Conclusion.

109. We have noticed in the present report only the more important subjects which have come before our Commission during the past year. On many other questions affecting the health of the army, or of other classes of the population, separate reports have been submitted to the Government, or other action has been taken. The indication of defects will always be the chief ordinary duty of a body such as ours, and it is, therefore, not to be wondered at while we have found many occasions for blame since our Commission was appointed, we have found comparatively few for praise. When, however, we look back upon the past, we believe that it may be said, with perfect truth, that in carrying out or in laying the foundation of great sanitary improvements, no Government has ever done more, in an equally short space of time, than the Government of India has done during the last few years.

I have, &c.

(signed) *John Strachey,*

President of the Sanitary Commission for Bengal.

* Health Officer's Report, 1865, page 9.

A P P E N D I X.

VITAL STATISTICS of the EUROPEAN ARMY of the BENGAL PRESIDENCY, for the Years 1858 to 1864, with a SUMMARY of the Results during the same Period for the NATIVE ARMY and the GAOL POPULATION. Compiled and Systematically Arranged from the Original Returns, by *James L. Bryden*, M.D., Assistant Surgeon, Bengal Medical Service; in charge of the Statistical Branch Office of the Principal Inspector General, Bengal Medical Department.

P R E F A C E.

THE Tables of the present Series are arranged in three divisions.

The First—the Series for 1858—may be considered to hold a place entirely apart from the Tables which have reference to the experience of the succeeding years. Such a position the events of the year claim for this section; and the more so, that it relates to an Army which was new to the country, and exposed in the Field throughout its first year of service in India: it necessarily illustrates, moreover, the Statistics of Provinces—and not of the Cantonments of the Presidency, to which the Statistics of the years which follow have a direct relation. The Troops employed in Central India, in 1858, were not on the strength of the Army of Bengal; and consequently, the Statistics of the Central India Campaign are not included in the results for the year.

The Second Division exhibits the Statistics of Cantonment Life in Bengal for the five years 1859—63. It is prefaced by a Summary showing, in ratios, the results for these years; and also the general Statistics of Women and Children, of Native Troops, and the Gaol Population during the same period.

The Third—containing the Statistics of the year 1864—is the commencement of a new Series, in which the sickness and mortality of the European and Native Army, and of the Gaol Population, is shown in a parallel and comparative form.

EUROPEAN TROOPS, 1858.

TABLES (pages 68 to 77).

The experience of an unacclimatized Army in its first year of service in India: the results due chiefly to exposure in the Field: a healthy and non-epidemic year in the Provinces which were specially the seat of war.

TABLE showing the SICKNESS and MORTALITY among the EUROPEAN TROOPS serving in the Bengal Presidency, during the Year 1858, and the prevalence of the principal Diseases in each Month of the Year.

Months.	Average Strength.	Average Number Daily Sick.	Daily sick per Cent. of Average Strength.	Number of Deaths.	Died per 1,000 of Average Strength.	CAUSES OF DEATHS IN HOSPITAL.																					
						Cholera.	Small-pox.	Intermittent Fevers.	Remittent Fevers.	Continued Fevers.	Dysentery, Acute.	Dysentery, Chronic.	Diarrhea.	Phthisis Pulmonalis.	Heat Apoplexy.	Delirium Tremens.	Respiratory Diseases.	Heart Diseases.	Hepatitis, Acute.	Hepatitis, Chronic.	All other Diseases.						
January -	35,775	3,459	9·67	151	-	7	2	10	9	5	39	4	14	5	-	2	15	-	14	3	6						
February -	36,690	2,966	8·03	100	-	20	1	3	7	8	21	4	9	4	2	-	3	1	4	2	1						
March -	40,229	3,482	8·66	209	-	25	5	5	6	22	39	3	9	3	1	-	5	-	3	5	7						
April -	42,616	4,542	10·65	332	-	42	29	2	29	60	71	8	24	7	13	1	4	-	10	2	9						
May -	44,187	5,962	13·49	951	-	26	31	8	47	143	117	13	32	7	426	6	10	2	12	7	30						
June -	44,741	6,270	14·01	536	-	46	6	7	18	77	66	11	26	8	205	-	16	4	10	12	17						
July -	44,995	5,974	13·28	409	-	112	-	8	22	35	73	11	21	11	60	5	7	1	17	11	13						
August -	45,858	6,215	13·55	500	-	58	-	4	25	42	193	19	39	14	45	4	9	3	14	14	16						
September -	46,241	6,339	13·71	512	-	31	-	11	18	54	224	16	50	7	20	3	8	2	36	8	20						
October -	47,401	5,648	11·91	312	-	15	-	13	20	34	107	14	38	9	3	5	9	2	19	5	17						
November -	46,391	4,285	9·24	225	-	17	-	7	17	18	53	19	14	12	1	1	10	1	18	8	18						
December -	50,111	4,021	8·02	164	-	2	1	3	5	11	50	13	10	9	2	1	10	2	10	12	12						
						401	75	81	223	509	1,053	185	286	96	778	28	106	18	167	89	166						
Died per 1,000 of Average Strength.																											
						43,771	4,930	11·26	4,401	100·55	9·16	1·71	1·85	5·09	11·63	24·06	3·08	6·53	2·19	17·77	·64	2·42	·41	3·81	2·03	3·80	4

Deaths out of Hospital, 462. Died per 1,000 of Average Strength, 10·52.

DISEASES.	NUMBER OF ADMISSIONS INTO HOSPITAL IN EACH MONTH.												Total Admissions during the Year.	Admitted per Cent. of Average Strength.	Died per Cent. of Average Strength.
	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.			
Small-pox -	1	10	27	146	59	40	7	-	-	-	6	17	313	137·88	1
Intermittent Fevers -	1,681	1,300	1,335	2,127	3,727	3,152	3,013	3,047	2,301	2,435	1,380	993	26,491		
Remittent Fevers -	37	81	258	742	998	1,524	1,071	1,062	732	493	216	122	7,336		
Continued Fevers -	290	435	895	2,543	5,129	4,723	3,801	3,603	2,485	1,411	704	474	26,493	6·37	15
Ophthalmia -	131	206	262	249	180	228	274	302	219	259	225	252	2,787		
Dysentery, Acute -	272	234	333	591	482	464	635	1,411	1,177	934	588	487	7,608		
Dysentery, Chronic -	87	88	62	76	68	77	73	111	125	228	136	132	1,263	20·26	2
Diarrhoea -	522	491	825	1,149	1,203	984	1,489	1,852	1,463	1,042	647	547	12,214		
Cholera -	13	47	60	91	42	92	167	112	62	20	26	6	738		
Rheumatism -	229	289	317	288	265	245	353	325	293	328	332	419	3,683	8·41	54
Veneral Diseases -	745	782	932	845	755	794	953	968	917	1,079	1,186	1,490	11,446	26·12	26
Phthisis Pulmonalis -	16	19	11	16	26	49	36	48	25	44	32	35	357		
Heat Apoplexy -	2	5	8	22	929	578	178	79	46	18	9	7	1,881		
Delirium Tremens -	22	12	7	7	18	24	30	29	28	34	30	26	267	·61	10
Epilepsy -	7	11	11	11	14	16	28	27	17	32	18	26	218	·50	2
Respiratory Diseases -	390	394	325	374	335	314	361	377	300	372	393	465	4,400		
Hepatitis, Acute -	81	94	87	120	149	178	162	191	214	231	210	177	1,894	6·70	
Hepatitis, Chronic -	44	53	59	61	53	88	82	113	108	148	124	108	1,041		
Abscess and Ulcer -	392	432	513	577	789	819	1,032	852	773	679	551	577	7,986		18·42
Wounds and Accidents -	851	647	1,062	746	514	397	385	402	358	498	576	614	7,050	16·10	-
All other Diseases -	483	507	588	756	1,122	1,131	1,217	1,209	986	1,157	798	766	10,720	24·50	
	6,296	6,137	7,977	11,537	16,857	15,917	15,347	16,120	12,629	11,442	8,187	7,740	136,186		
Admitted per Cent. of Average Strength in each Month.															
	18·23	16·73	19·83	27·07	38·15	35·57	34·11	35·15	27·31	24·14	17·64	15·45	311·13		

EUROPEAN TROOPS, 1858—continued.

TABLE showing the Causes of SICKNESS and MORTALITY among the Men of EUROPEAN CORPS, under Treatment in the GENERAL MILITARY HOSPITALS at FORT WILLIAM, during the Year 1858.

MONTHS.	Average Number daily treated in Hospital.	Number of Deaths.	CAUSES OF DEATH.																
			Cholera.	Small-pox.	Intermittent Fevers.	Remittent Fevers.	Continued Fevers.	Dysentery, Acute.	Dysentery, Chronic.	Diarrhoea.	Phthisis Pulmonalis.	Heat Apoplexy.	Delirium Tremens.	Respiratory Diseases.	Heart Diseases.	Hepatitis, Acute.	Hepatitis, Chronic.	All other Diseases.	Wounds and Accidents.
January - - -	394	12	-	-	-	-	-	1	3	-	1	-	-	2	-	1	2	1	1
February - - -	234	9	4	-	-	-	-	2	1	-	-	-	-	-	-	-	2	-	-
March - - -	204	17	13	-	-	-	-	1	-	-	2	-	-	-	-	-	1	-	-
April - - -	247	36	28	-	-	-	-	2	-	1	2	-	-	-	-	-	1	2	-
May - - -	187	10	3	-	-	-	-	-	1	-	2	1	-	2	-	-	-	-	1
June - - -	277	38	19	-	-	-	5	1	1	1	3	4	-	1	-	-	1	1	1
July - - -	284	36	23	-	-	1	4	1	-	1	4	-	-	1	-	-	1	-	-
August - - -	229	22	5	-	-	-	2	2	3	5	2	-	-	1	-	-	2	-	-
September - - -	212	12	-	-	-	-	-	3	3	2	1	1	-	-	-	-	2	-	-
October - - -	213	9	3	-	-	-	-	-	2	-	1	-	-	1	-	-	2	-	-
November - - -	273	16	3	-	-	-	-	-	4	-	5	-	-	-	-	-	3	1	-
December - - -	224	9	-	-	-	-	-	-	4	-	4	-	-	-	-	-	-	-	1
	248	226	101	-	-	1	11	13	22	10	27	6	-	8	-	1	17	5	4

DISEASES.	NUMBER OF ADMISSIONS INTO HOSPITAL IN EACH MONTH.												Admitted during the Year.	Died per Cent. of Admissions.
	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.		
Small-pox - - -	-	-	-	1	-	-	-	-	-	-	-	-	1	-
Intermittent Fever - - -	14	17	1	6	10	6	12	4	5	4	8	10	97	1.51
Remittent Fevers - - -	5	2	1	10	2	-	7	-	2	-	3	1	33	
Continued Fevers - - -	15	18	8	80	78	198	164	59	12	10	9	11	662	
Ophthalmia - - -	17	12	9	16	7	29	14	6	6	6	21	12	155	-
Dysentery, Acute - - -	5	5	5	6	3	22	30	15	12	7	10	5	125	10.40
Dysentery, Chronic - - -	30	30	9	12	5	10	10	26	28	76	57	43	336	6.55
Diarrhoea - - -	16	14	11	78	12	29	53	25	9	8	13	6	274	3.65
Cholera - - -	-	5	23	51	2	35	32	13	-	4	3	1	169	59.77
Rheumatism - - -	14	10	7	15	10	13	10	9	11	18	39	29	185	-
Veneral Diseases - - -	32	41	21	53	25	62	35	17	14	20	22	19	361	-
Phthisis Pulmonalis - - -	7	5	3	5	7	5	3	6	1	9	13	17	81	33.33
Heat Apoplexy - - -	1	2	2	1	2	5	1	11	7	8	6	-	46	13.00
Delirium Tremens - - -	-	-	-	-	1	1	-	-	1	-	1	2	6	-
Epilepsy - - -	-	1	2	3	1	3	3	2	1	5	4	5	30	-
Respiratory Diseases - - -	13	19	7	24	14	22	15	12	11	23	21	8	189	4.23
Hepatitis, Acute - - -	3	-	-	1	1	5	3	-	1	1	7	-	22	4.55
Hepatitis, Chronic - - -	14	15	7	15	3	6	5	14	11	36	42	19	187	9.09
Abscess and Ulcer - - -	25	23	7	31	12	20	25	18	7	11	13	9	201	-
Wounds and Accidents - - -	264	128	61	90	11	29	19	10	28	28	54	32	754	-
All other Diseases - - -	35	50	27	68	42	57	38	32	38	82	160	50	679	-
	510	397	211	566	248	557	479	279	205	356	506	279	4,593	

In addition to admissions of the sick of detachments recently disembarked, the re-admissions of sick and wounded men collected at Calcutta previous to embarkation for England, are included in this table. The admissions from chronic disease, therefore, bear no relation except to the army as a whole; and as the sick were under observation for a limited period only, no special significance is to be attached to the mortality rate appended to the respective diseases. The ratio of mortality to admissions from acute diseases, will, in several instances, be found allied to the rates prevailing in Lower Bengal generally. In the case of heat apoplexy, however, a discrepancy is very apparent; and it may be remarked here, as applicable to the statistics of this disease throughout the series of tables, that from the fact of the various minor results of exposure to heat influence, as well as the graver, being returned under terms used indifferently for both, the importance of any manifestation of heat influence may be more correctly estimated by the absolute mortality, than by the mortality relative to the number treated.

TABLE showing the SICKNESS and MORTALITY among the EUROPEAN TROOPS serving in Bengal Proper during the Year 1858, and the prevalence of the principal Diseases in each Month of the Year.

Months.	CAUSES OF DEATH.																								
	Average Strength.	Average Number Daily Sick.	Daily Sick per Cent. of Average Strength.	Number of Deaths.	Died per 1,000 of Average Strength.	Cholera.	Small-pox.	Intermittent Fevers.	Remittent Fevers.	Continued Fevers.	Dysentery, Acute.	Dysentery, Chronic.	Diarrhea.	Phthisis Pulmonalis.	Heat Apoplexy.	Delirium Tremens.	Respiratory Diseases.	Heart Diseases.	Hepatitis, Acute.	Hepatitis, Chronic.	All other Diseases.	Wounds and Accidents.			
January	2,501	228	9.12	7	-	4	-	-	-	-	-	1	1	-	-	-	-	-	1	-	-	-			
February	2,975	191	6.44	19	-	16	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-			
March	2,524	235	9.33	9	-	7	-	-	-	-	1	1	-	-	-	-	-	-	-	-	1	-			
April	2,844	252	8.89	14	-	9	-	-	-	1	1	-	3	-	2	-	-	-	-	-	1	-			
May	2,925	325	11.12	30	-	11	-	1	1	3	4	-	-	1	4	-	-	-	-	-	2	-			
June	4,519	343	7.59	52	-	25	-	-	2	8	3	-	3	-	12	-	-	1	1	-	-	-			
July	3,852	434	11.29	81	-	55	-	-	-	1	18	1	3	-	-	1	1	1	-	-	1	-			
August	3,677	468	12.73	80	-	27	-	-	-	11	30	-	3	2	2	-	1	1	-	1	2	-			
September	4,199	403	9.60	66	-	2	-	-	1	7	32	1	5	-	3	-	2	-	9*	1	3	-			
October	4,987	379	7.61	23	-	5	-	-	-	-	9	-	4	-	-	-	2	-	-	-	1	2			
November	4,665	322	6.91	23	-	11	-	-	1	3	5	1	1	-	-	1	-	-	-	-	-	-			
December	3,098	235	7.61	1	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-			
						172	-	1	5	34	106	5	21	3	23	2	6	2	11	3	11	-			
Died per 1,000 of Average Strength.																									
						48.26	-	.28	1.40	9.54	30.00	1.40	5.89	.84	6.45	.56	1.68	.56	3.08	.84	3.08	-			
NUMBER OF ADMISSIONS INTO HOSPITAL IN EACH MONTH.																									
DISEASES.	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Total Admissions during the Year.	Admitted per Cent. of Average Strength.	Died per Cent. of Admissions.										
Small-pox	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-										
Intermittent Fevers	22	1	4	16	34	10	56	76	124	105	59	40	547	-	-										
Remittent Fevers	-	-	-	-	9	85	-	7	9	5	15	4	134	76.90	1.45										
Continued Fevers	52	63	50	209	477	381	342	188	147	41	83	27	2,060	-	-										
Ophthalmia	15	6	11	12	8	8	14	8	13	7	19	8	129	3.62	-										
Dysentery, Acute	25	9	18	21	20	23	107	146	91	50	37	25	572	17.81	17.48										
Dysentery, Chronic	2	6	2	1	1	8	2	6	13	10	7	5	63	-	-										
Diarrhœa	56	59	71	42	57	108	245	142	136	69	43	27	1,055	29.60	1.99										
Cholera	8	40	15	23	14	41	73	43	7	7	18	-	289	8.11	59.51										
Rheumatism	19	9	24	13	21	13	20	16	15	14	15	23	202	5.66	-										
Veneral Diseases	97	58	108	60	62	79	88	86	70	55	127	86	973	27.30	-										
Phthisis Pulmonalis	2	-	1	3	2	4	2	10	-	4	2	3	33	.92	9.09										
Heat Apoplexy	-	-	-	4	6	22	3	2	4	-	1	-	42	1.17	54.76										
Delirium Tremens	1	-	-	-	2	1	1	-	3	1	7	7	23	.64	8.69										
Epilepsy	2	-	1	-	2	2	4	-	4	2	-	2	19	.53	-										
Respiratory Diseases	32	15	26	10	19	21	26	30	27	35	25	21	287	8.05	2.09										
Hepatitis, Acute	10	4	1	1	6	10	5	22	25	10	14	7	115	5.10	7.69										
Hepatitis, Chronic	7	9	5	-	4	4	5	6	9	4	10	4	67	-	-										
Abscess and Ulcer	39	25	36	31	53	83	100	52	57	60	55	43	634	17.78	-										
Wounds and Accidents	20	12	16	22	11	20	17	12	16	23	26	27	222	6.22	-										
All other Diseases	46	26	58	42	71	87	111	73	84	220	57	56	931	26.12	-										
													455	342	447	510	879	1,010	1,218	925	854	722	620	415	8,397
Admitted per Cent. of Average Strength in each Month.																									
													18.19	11.50	17.71	17.93	30.05	22.35	31.62	25.15	20.33	14.47	13.29	13.39	235.75

The constant variation in the strength of the depôts in Lower Bengal has probably led to some irregularities in drawing up the returns for certain months. The low sick rate of June is due to a great increase in the strength of the Dum-Dum depôt, while no corresponding increase in the number daily under treatment in hospital is shown in the returns of the month.

* In his annual report for the year, the medical officer who returns these deaths explains that all were cases of dysentery, running to a fatal termination by complication with abscess of the liver. They should, therefore, properly have appeared under the head of dysentery.

SANITARY COMMISSION FOR BENGAL, 1864-65.

EUROPEAN TROOPS, 1858—continued.

TABLE showing the SICKNESS and MORTALITY among the EUROPEAN TROOPS serving in the *Dinapore, Benares, and Oude* Districts, during the Year 1858, and the prevalence of the principal Diseases in each Month of the Year.

Months.	Average Strength.	Average Number Daily Sick.	Daily Sick per Cent. of Average Strength.	Number of Deaths.	Died per 1,000 of Average Strength.	CAUSES OF DEATH.																				
						Cholera.	Small-pox.	Intermittent Fevers.	Remittent Fevers.	Continued Fevers.	Dysentery, Acute.	Dysentery, Chronic.	Diarrhoea.	Phthisis Pulmonalis.	Heat Apoplexy.	Delirium Tremens.	Respiratory Diseases.	Heart Diseases.	Hepatitis, Acute.	Hepatitis, Chronic.	All other Diseases.					
January	17,516	944	5.39	48	-	-	-	2	5	2	18	-	4	-	-	-	7	-	2	-	-					
February	18,397	926	5.03	20	-	-	1	-	3	4	3	-	-	3	1	-	1	1	1	-	-					
March	18,349	1,266	6.90	120	-	-	3	1	3	13	17	2	4	-	1	-	2	-	1	2	-					
April	15,169	1,891	12.46	146	-	3	19	-	16	32	33	4	10	-	3	-	1	-	7	1	-					
May	15,136	2,306	15.23	491	-	8	24	2	17	64	60	7	16	1	251	2	2	-	5	2	11					
June	14,150	2,462	17.40	246	-	-	4	1	9	34	31	7	14	3	117	-	8	3	2	5	4					
July	16,172	2,270	14.03	102	-	2	-	2	6	13	30	5	7	3	14	2	-	1	8	4	-					
August	16,795	2,382	14.18	193	-	4	-	-	6	18	103	7	19	5	3	-	3	-	12	6	-					
September	16,971	2,679	15.79	235	-	1	-	6	3	34	115	7	25	-	13	2	5	-	14	-	-					
October	17,584	2,449	13.93	163	-	1	-	10	6	17	68	8	24	2	1	2	2	1	12	1	-					
November	21,463	1,829	8.52	109	-	-	-	2	12	12	32	1	6	4	1	-	7	-	11	3	-					
December	24,070	1,876	7.80	86	-	2	-	-	3	8	33	5	5	1	-	-	5	1	5	7	-					
						21	51	26	89	251	543	53	134	22	405	8	43	7	80	31	61					
Died per 1,000 of Average Strength.																										
						17.648	1.940	11.00	1.959	111.00	1.19	2.85	1.47	5.05	14.22	30.70	3.00	7.59	1.24	23.00	.45	2.44	.40	4.53	1.76	3.40

DISEASES.	NUMBER OF ADMISSIONS INTO HOSPITAL IN EACH MONTH.												Total Admissions during the Year.	Admitted per Cent. of Average Strength.	per Ad.													
	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.																
Small-pox	-	9	21	107	40	21	6	-	-	-	-	7	211	1.19	-													
Intermittent Fevers	129	147	203	327	241	250	214	286	444	666	381	305	3,593	105.36	-													
Remittent Fevers	18	52	222	385	511	699	350	331	242	173	114	86	3,183		-													
Continued Fevers	58	174	523	1,285	2,182	2,467	1,513	1,232	1,175	737	298	185	11,819		-													
Ophthalmia	43	97	107	101	62	62	112	99	79	108	90	146	1,106	6.26	-													
Dysentery, Acute	72	75	157	323	227	189	286	785	608	521	315	307	3,865	24.03	-													
Dysentery, Chronic	9	19	26	27	32	27	24	44	52	54	24	38	376		-													
Diarrhoea	135	203	455	549	570	368	609	812	595	445	297	282	5,320	30.14	-													
Cholera	1	1	16	15	17	11	8	96	4	1	-	5	95	.54	-													
Rheumatism	53	94	90	84	60	48	111	117	96	152	130	187	1,222	6.92	-													
Veneral Diseases	196	294	280	264	283	243	415	459	446	495	578	858	4,811	27.26	-													
Phthisis Pulmonalis	1	4	1	1	9	21	4	12	11	9	6	6	95	.54	-													
Heat Apoplexy	1	2	3	5	620	364	59	16	23	5	2	4	1,104	6.26	-													
Delirium Tremens	4	5	3	2	5	8	5	10	11	16	10	6	85	.48	-													
Epilepsy	-	3	1	4	3	4	7	9	2	7	7	10	57	.32	-													
Respiratory Diseases	87	102	126	140	110	72	105	107	101	119	165	228	1,462	8.30	-													
Hepatitis, Acute	19	16	37	61	40	62	52	77	92	99	101	95	751	6.04	-													
Hepatitis, Chronic	3	11	26	19	19	31	26	39	32	51	27	31	315		-													
Abscess and Ulcer	112	167	233	225	273	235	286	281	276	297	245	311	2,941		16.66													
Wounds and Accidents	83	209	661	264	138	120	111	153	109	206	211	267	2,532	14.35	-													
All other Diseases	91	135	176	217	391	285	332	308	274	294	214	311	3,028	17.16	-													
													1,115	1,519	3,367	4,405	5,833	5,587	4,645	5,193	4,672	4,455	3,205	3,675	47,971			
Admitted per Cent. of Average Strength in each Month.																												
															6.36	9.88	18.35	29.04	38.53	39.48	28.71	30.93	27.51	25.33	14.93	15.27		271.81

FIRST ANNUAL REPORT OF THE

EUROPEAN TROOPS, 1858—continued.

TABLE showing the SICKNESS and MORTALITY among the EUROPEAN TROOPS serving in the Allahabad, Meerut, Rohilcund and Agra Districts, during the Year 1858, and the prevalence of the principal Diseases in each Month of the Year.

Months.	Average Strength.	Average Number Daily Sick.	Daily Sick per Cent. of Average Strength.	Number of Deaths.	Died per 1,000 of Average Strength.	CAUSES OF DEATH.																					
						Cholera.	Small-pox.	Intermittent Fevers.	Remittent Fevers.	Continued Fevers.	Dysentery, Acute.	Dysentery, Chronic.	Diarrhea.	Phthisis Pulmonalis.	Heat Apoplexy.	Delirium Tremens.	Respiratory Diseases.	Heart Diseases.	Hepatitis, Acute.	Hepatitis, Chronic.	Other Diseases.	Wounds and Accidents.					
January	8,718	1,226	14.07	52	-	3	2	1	1	2	15	-	3	3	-	1	3	-	9	-	2	7					
February	8,604	1,075	12.51	44	-	-	-	3	1	4	13	1	8	1	1	-	-	-	3	-	1	8					
March	10,045	1,153	11.48	51	-	5	2	2	2	7	18	-	4	-	-	-	3	1	1	1	3	3					
April	14,338	1,462	10.20	124	-	2	10	2	13	23	34	4	13	4	6	-	1	-	3	-	3	6					
May	15,527	1,908	12.30	360	-	-	4	1	27	62	41	2	10	2	164	3	6	1	6	4	13	14					
June	14,674	2,064	14.06	157	-	1	2	2	7	27	27	1	6	-	60	-	4	-	6	5	8	1					
July	13,695	1,928	14.08	106	-	4	-	2	13	10	17	4	5	1	26	1	4	-	7	5	6	1					
August	13,580	1,966	14.48	95	-	3	-	-	12	6	47	3	10	2	-	1	2	1	1	4	2	1					
September	14,174	2,107	14.86	131	-	1	-	4	11	6	61	2	17	5	2	-	1	-	11	4	5	1					
October	13,951	1,886	13.52	86	-	1	-	3	12	12	24	2	9	5	1	2	4	1	5	1	3	1					
November	9,667	1,281	13.25	50	-	-	-	2	2	2	11	9	6	1	-	-	3	1	4	2	5	2					
December	10,798	1,040	9.64	47	-	-	-	3	2	2	13	2	4	2	1	1	3	1	3	4	2						
						20	20	25	103	163	321	30	95	26	261	9	34	5	59	30	53	49					
						Died per 1,000 of Average Strength.																					
						12.315	1.591	12.92	1.203	105.80	1.62	1.62	2.03	8.36	13.23	26.06	2.43	7.71	2.11	21.20	.73	2.76	.40	4.80	2.43	4.30	4.00

DISEASES.	NUMBER OF ADMISSIONS INTO HOSPITAL IN EACH MONTH.												Total Admissions during the Year.	Admitted per Cent. of Average Strength.	Died per Cent. of Admissions.										
	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.													
Small-pox	-	1	6	38	16	18	1	-	-	-	-	1	81	173.40	1.36										
Intermittent Fevers	342	283	474	608	1,170	1,070	1,112	1,258	1,125	1,166	607	371	9,586												
Remittent Fevers	6	21	27	326	420	696	686	605	384	286	61	15	3,533	21.92	13.00										
Continued Fevers	153	159	261	741	1,384	1,365	1,315	1,299	776	430	224	128	8,235												
Ophthalmia	46	70	101	89	54	81	92	127	72	104	61	53	950	30.65	2.51										
Dysentery, Acute	145	112	111	206	174	162	153	372	353	255	174	105	2,322												
Dysentery, Chronic	38	28	18	31	15	20	31	20	20	77	45	35	378	30.65	2.51										
Diarrhoea	251	157	249	345	363	309	339	581	499	389	167	126	3,775												
Cholera	4	1	6	2	1	3	11	5	16	4	2	-	55	45	38.18										
Rheumatism	67	91	89	86	63	77	99	91	78	75	65	68	949												
Veneral Diseases	316	260	342	262	197	242	245	253	232	341	283	323	3,296	26.76	-										
Phthisis Pulmonalis	4	6	5	6	5	9	13	7	5	12	8	4	84												
Heat Apoplexy	-	1	2	9	291	172	76	5	5	4	-	2	567	4.60	46.03										
Delirium Tremens	9	-	2	3	7	10	22	9	10	12	9	7	100												
Epilepsy	5	6	4	2	6	2	7	9	9	11	4	4	69	8.1	9.00										
Respiratory Diseases	113	139	92	119	87	112	128	125	88	115	95	92	1,305												
Hepatitis, Acute	29	54	38	37	71	69	63	58	75	88	54	40	676	8.12	8.90										
Hepatitis, Chronic	17	11	17	21	19	27	28	31	36	44	35	38	324												
Abscess and Ulcer	168	149	167	185	267	304	391	298	234	199	125	97	2,584	20.98	-										
Wounds and Accidents	405	209	215	260	248	116	145	126	129	146	186	146	2,331												
All other Diseases	172	171	193	251	324	475	449	456	374	391	224	184	3,664	18.92	-										
												2,290	44,864												
												Admitted per Cent. of Average Strength in each Month.													
												26.28	22.42	24.08	25.29	33.37	36.38	39.47	42.23	31.88	29.74	25.12	17.03	364.30	

The high sick-rates of January and February are due to re-admissions into the hospitals of this Division of the sick of the army of the Commander in Chief, who were left behind on the occasion of the advance into Oude. The sick-rates for the Oude Province are proportionately diminished.

SANITARY COMMISSION FOR BENGAL, 1864-65.

EUROPEAN TROOPS, 1858—continued.

TABLE showing the SICKNESS and MORTALITY among the EUROPEAN TROOPS serving in the *Punjab* during the Year 1858, and the Prevalence of the principal Diseases in each Month of the Year.

Months.	Average Strength.	Average Number Daily Sick.	Daily Sick per Cent. of Average Strength.	Number of Deaths.	Died per 1,000 of Average Strength.	CAUSES OF DEATH.															
						Cholera.	Small-pox.	Intermittent Fevers.	Remittent Fevers.	Continued Fevers.	Dysentery, Acute.	Dysentery, Chronic.	Diarrhoea.	Phthisis Pulmonalis.	Heat Apoplexy.	Delirium Tremens.	Respiratory Diseases.	Heart Disease.	Hepatitis, Acute.	Hepatitis, Chronic.	Other Diseases.
January -	7,040	664	9.43	32	-	-	-	7	3	1	5	-	6	1	-	1	3	-	1	1	3
February -	6,714	538	8.02	8	-	-	-	-	3	-	1	2	-	-	-	-	2	-	-	-	-
March -	9,311	624	6.70	12	-	-	-	2	1	2	2	-	1	1	-	-	-	-	1	1	-
April -	10,265	687	6.70	12	-	-	-	-	-	4	1	-	-	1	2	1	2	-	-	-	1
May -	10,599	1,235	11.65	60	-	4	3	4	2	14	12	3	3	1	6	1	6	1	1	1	4
June -	11,398	1,123	9.85	43	-	1	-	4	-	3	4	2	5	2	12	-	3	-	1	1	4
July -	11,276	1,056	9.37	84	-	28	-	4	2	7	7	1	5	3	20	1	1	-	2	1	2
August -	11,805	1,168	9.90	110	-	19	-	4	7	5	11	6	2	3	40	3	2	1	1	1	5
September -	10,897	936	8.60	68	-	27	-	1	3	7	13	3	1	1	1	1	-	2	2	1	4
October -	10,879	718	6.60	30	-	5	-	-	2	5	6	2	1	1	1	1	-	-	2	-	4
November -	10,596	580	5.47	28	-	3	-	3	2	1	5	4	1	2	-	-	-	-	3	-	4
December -	12,145	643	5.30	21	-	-	1	-	-	1	3	2	1	2	1	-	2	-	2	1	5
						87	4	29	25	50	70	25	26	18	83	9	15	4	16	8	36
						Died per 1,000 of Average Strength.															
						8.50	39	2.83	2.44	4.88	6.83	2.44	2.53	1.75	8.10	.88	1.46	.39	1.56	.78	3.51

DISEASES.	NUMBER OF ADMISSIONS INTO HOSPITAL IN EACH MONTH.												Total Admissions during the Year.	Admitted per Cent. of Average Strength.	Died per Cent. of Average Strength.	
	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.				
Small-pox - - -	1	-	-	-	3	1	-	-	-	-	6	9	20	164.37	1	2
Intermittent Fevers - - -	1,174	852	653	1,170	2,272	1,816	1,619	1,423	603	494	325	267	12,668			
Remittent Fevers - - -	8	6	8	21	56	44	28	119	95	29	23	16	453	8.14	1	6
Continued Fevers - - -	12	21	53	228	1,008	312	467	825	375	193	100	123	3,717			
Ophthalmia - - -	10	21	34	31	49	48	42	62	49	34	34	33	447	17.47	6	1
Dysentery, Acute - - -	25	33	42	35	58	68	59	93	113	101	52	45	724			
Dysentery, Chronic - - -	8	5	7	5	15	12	6	15	12	11	3	11	110	12.27	2	1
Diarrhoea - - -	64	58	39	135	201	170	243	292	224	131	127	106	1,790			
Cholera - - -	-	-	-	-	8	2	43	35	35	4	3	-	130	20.00	1	6
Rheumatism - - -	76	85	107	90	111	94	113	92	93	69	83	112	1,125			
Venereal Diseases - - -	104	129	181	206	188	163	173	153	155	168	176	204	2,005	1.19	6	1
Phthisis Pulmonalis - - -	2	4	1	1	3	10	4	13	8	10	3	5	64			
Heat Apoplexy - - -	-	-	1	3	10	15	39	45	7	1	-	1	122	.51	1	6
Delirium Tremens - - -	8	7	2	2	3	4	2	10	3	5	3	4	53			
Epilepsy - - -	-	1	3	2	2	5	7	7	1	7	3	5	43	11.30	1	1
Respiratory Diseases - - -	145	119	74	81	105	87	87	103	73	80	87	116	1,157			
Hepatitis, Acute - - -	20	20	11	20	31	32	39	34	21	33	34	35	330	4.66	8	8
Hepatitis, Chronic - - -	3	7	4	6	8	20	18	23	20	13	10	16	148			
Abscess and Ulcer - - -	48	68	70	105	184	177	230	203	199	112	113	117	1,626	15.87	1	1
Wounds and Accidents - - -	79	89	109	110	106	112	93	101	76	95	99	142	1,211			
All other Diseases - - -	139	125	134	178	294	227	287	340	216	170	143	165	2,418	23.60	1	1
													30,361			
Admitted per Cent. of Average Strength in each Month.																
													27.35	24.57	16.46	296.38
													23.65	44.48	30.04	
													31.91	33.79	21.82	
													16.17	13.47	12.61	

COMPARATIVE STATEMENT of the Ratios of Sickness and Mortality among the European Troops serving in the various PROVINCES of the *Bengal* Presidency, during the Year 1858.

	BENGAL PROPER.				DINAPORE, BENARES, AND OUDE.				CAWNPORE, MEERUT, AND AGRA.				PUNJAB.				BENGAL PRESIDENCY.			
	Average Strength	Died per Cent. of Strength	Died per 1,000 of Average Strength	Admitted per Cent. of Strength	Average Strength	Died per Cent. of Strength	Died per 1,000 of Average Strength	Admitted per Cent. of Average Strength	Average Strength	Died per Cent. of Strength	Died per 1,000 of Average Strength	Admitted per Cent. of Average Strength	Average Strength	Died per Cent. of Strength	Died per 1,000 of Average Strength	Admitted per Cent. of Average Strength	Average Strength	Died per Cent. of Strength	Died per 1,000 of Average Strength	Admitted per Cent. of Average Strength
DISEASES.																				
Cholera	811	59.51	48.26	-	54	22.10	1.19	.45	38.18	1.62	8.50	1.27	66.92	8.50	1.68	54.33	9.16			
Small-pox	-	-	-	-	1.19	24.17	2.85	.65	24.70	1.62	.39	.19	20.00	.39	.71	23.96	1.71			
Revers	76.90	1.45	11.22	-	105.36	1.97	20.74	173.40	1.36	23.62	10.15	164.37	.63	10.15	137.88	1.34	18.57			
Dysentery	17.81	17.48	31.40	-	24.03	14.05	33.70	21.92	13.00	28.49	9.27	8.14	11.39	9.27	20.26	13.39	27.14			
Diarrhea	29.60	1.99	5.89	-	30.14	2.51	7.59	30.65	2.51	7.71	2.53	17.47	1.45	2.53	27.90	2.34	6.53			
Hepatitis	5.10	7.69	3.92	-	6.04	10.41	6.29	8.12	8.90	7.23	2.34	4.66	5.02	2.34	6.70	8.72	5.84			
Ophthalmia	3.62	-	-	-	6.26	-	-	7.71	-	-	-	4.36	-	-	6.37	-	-			
Rheumatism	5.66	-	-	-	6.92	-	-	7.70	-	-	-	11.00	-	-	8.41	-	-			
Veneral Diseases	27.30	-	-	-	27.26	-	-	26.76	-	-	-	20.00	-	-	26.12	-	-			
Phthisis Pulmonalis	.92	9.09	.84	-	.54	23.16	1.24	.68	31.00	2.11	1.75	.62	28.12	1.75	.81	26.89	2.19			
Heat Apoplexy	1.17	54.76	6.45	-	6.26	36.68	23.00	4.60	46.03	21.20	8.10	1.19	68.03	8.10	4.29	41.36	17.77			
Delirium Tremens	.64	8.69	.56	-	.48	9.41	.45	.81	9.00	.73	.88	.51	17.00	.88	.61	10.50	.64			
Epilepsy	.53	-	-	-	.32	-	-	.56	-	-	-	.42	-	-	.50	-	-			
Respiratory Diseases	8.05	2.09	1.68	-	8.30	2.94	2.44	10.60	2.60	2.76	1.46	1.30	1.30	1.46	10.05	2.41	2.42			
Abscess and Ulcer	17.78	-	-	-	16.66	-	-	20.98	-	-	-	15.87	-	-	18.24	-	-			
Wounds and Accidents	6.22	-	-	-	14.35	-	7.65	18.92	-	4.00	-	11.82	-	-	16.10	-	4.34			
All other Diseases	26.12	-	3.64	-	17.16	-	3.56	29.75	-	4.70	4.19	23.60	-	-	24.50	.85	4.21			
	235.75	-	113.63	-	271.81	-	111.00	364.30	-	105.80	49.59	296.38	-	-	311.13	-	100.55			

EUROPEAN TROOPS, 1858—continued.

TABLE showing the PREVALENCE of SMALL-POX in each Month, and the Distribution of the DISEASE by STATIONS and PROVINCES.

STATION.	Average Strength for Twelve Months.	NUMBER OF ADMISSIONS INTO HOSPITAL IN EACH MONTH.												Total Admissions.	Admitted per Cent. of Average Strength.	Number of Deaths.	Died per 1,000 of Average Strength.
		January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.				
Presidency Hospitals	-	-	-	-	1	-	-	-	-	-	-	-	-	1	-	-	-
Fort William	770	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dum-Dum	745	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Barrackpore	1,272	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chinsurah Depôt	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Raneegunge Depôt	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Berhampore	281	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	3,564	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Darjeeling	137	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hazareebaugh	211	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dinapore	877	-	4	-	2	-	-	-	-	-	-	-	-	6	-	3	-
Shahabad	1,352	-	-	-	1	1	1	2	-	-	-	-	-	5	-	1	-
Sasseram	340	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ghazepore	435	-	-	3	3	1	-	-	-	-	-	-	-	7	-	2	-
Benares	511	-	3	2	7	6	-	-	-	-	-	-	-	18	-	4	-
Chunar	46	-	-	-	-	1	-	-	-	-	-	-	-	1	-	1	-
Azimghur	504	-	-	-	4	1	-	-	-	-	-	-	-	5	-	2	-
Goruckpore District	1,077	-	2	-	4	-	-	-	-	-	-	-	-	6	-	-	-
Oude	12,153	-	-	16	86	30	20	4	-	-	-	-	7	163	-	38	-
	17,648	-	9	21	107	40	21	6	-	-	-	-	7	211	1.19	51	2.85
Allahabad and Cawnpore Districts	4,788	-	-	6	22	10	2	1	-	-	-	-	-	41	-	9	-
Robilcund	3,285	-	-	-	16	6	16	-	-	-	-	-	-	38	-	9	-
Meerut	1,528	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Delhi	1,411	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Agra	883	-	-	-	-	-	-	-	-	-	-	-	1	1	-	1	-
Agra District	420	-	1	-	-	-	-	-	-	-	-	-	-	1	-	1	-
	12,315	-	1	6	38	16	18	1	-	-	-	-	1	81	.65	20	1.62
Umballa	941	-	-	-	-	2	-	-	-	-	-	-	-	2	-	2	-
Dugshaie	176	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Subathoo	59	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Kussowlie	46	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Phillour	110	-	-	-	-	1	-	-	-	-	-	-	-	1	-	1	-
Jullundur	898	-	-	-	-	-	1	-	-	-	-	-	-	1	-	-	-
Ferozepore	740	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Meeran Meer	1,317	-	-	-	-	-	-	-	-	-	-	-	2	2	-	-	-
Lahore Citadel	64	-	-	-	-	-	-	-	-	-	-	-	1	1	-	-	-
Umritsir	361	-	-	-	-	-	-	-	-	-	-	2	-	2	-	-	-
Govindghur	123	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Mooltan	233	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dera Ismael Khan	148	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Kangra	18	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sealkote	896	-	-	-	-	-	-	-	-	-	-	1	1	2	-	1	-
Dhurramsalla	7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Rawul Pindee	1,039	1	-	-	-	-	-	-	-	-	-	1	1	3	-	-	-
Attock	196	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Nowshera	412	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Campbellpore	319	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Peshawur	2,027	-	-	-	-	-	-	-	-	-	-	2	4	6	-	-	-
Murree	114	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	10,244	1	-	-	-	3	1	-	-	-	-	6	9	20	.19	4	.39
BENGAL PRESIDENCY	43,771	1	10	27	146	59	40	7	-	-	-	6	17	313	.71	75	1.71

EUROPEAN TROOPS, 1858—continued.

TABLE showing the PREVALENCE of CHOLERA in each Month, and the Distribution of the DISEASE by STATIONS and PROVINCES.

STATION.	Average Strength for Twelve Months.	NUMBER OF ADMISSIONS INTO HOSPITAL IN EACH MONTH.												Total Admis- sions.	Admitted per Cent. of Average Strength.	Number of Deaths.	Died per 1,000 of Average Strength.
		January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.				
Presidency Hospitals -	770	-	5	23	51	2	35	32	13	-	4	3	1	169	-	101	-
Fort William -	770	1	2	12	19	5	11	20	14	-	4	4	-	92	-	55	-
Dum-Dum -	745	1	-	-	-	-	8	13	18	1	3	2	-	46	-	30	-
Barrackpore -	1,272	-	2	-	-	3	2	5	2	-	-	-	-	14	-	5	-
Chinsurah Depôt -	-	5	-	-	-	1	20	32	1	1	-	-	-	60	-	45	-
Raneegunge and G. T. Road -	-	1	36	3	1	5	-	3	1	-	-	11	-	61	-	30	-
Berhampore -	281	-	-	-	3	-	-	-	7	5	-	1	-	16	-	7	-
	3,564	8	40	15	23	14	41	73	43	7	7	18	-	289	8.11	172	48.26
Darjeeling -	137	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hazareebaugh -	211	-	-	-	-	-	-	1	-	-	-	-	-	1	-	-	-
Dinapore -	877	-	-	1	3	-	2	-	2	-	-	-	2	10	-	1	-
Shahabad -	1,352	-	-	-	1	3	-	-	11	2	-	-	-	17	-	5	-
Sasseram -	340	-	-	-	2	1	-	-	11	-	-	-	-	3	-	-	-
Ghazee pore -	435	-	-	1	2	3	1	-	-	-	-	-	-	7	-	3	-
Benares -	511	1	-	7	1	3	5	4	-	-	-	-	-	21	-	7	-
Chunar -	46	-	-	-	-	-	-	-	-	-	-	1	-	1	-	-	-
Azimghur -	504	-	-	-	-	2	-	2	-	-	-	-	-	4	-	-	-
Goruckpore District -	1,077	-	-	2	-	-	1	1	-	-	-	-	-	4	-	-	-
Oude -	12,158	-	1	5	6	5	2	-	3	2	1	-	2	27	-	5	-
	17,648	1	1	16	15	17	11	8	16	4	1	-	5	95	54	21	1.19
Allahabad and Cawn- pore Districts -	4,788	4	1	5	2	1	2	2	-	-	4	2	-	23	-	11	-
Robileund -	3,285	-	-	-	-	-	-	5	2	-	-	-	-	7	-	1	-
Meerut -	1,528	-	-	-	-	-	-	3	1	-	-	-	-	4	-	3	-
Delhi -	1,411	-	-	-	-	-	-	1	-	11	-	-	-	12	-	1	-
Agra -	883	-	-	-	-	-	1	-	2	5	-	-	-	8	-	3	-
Agra District -	420	-	-	1	-	-	-	-	-	-	-	-	-	1	-	1	-
	12,315	4	1	6	2	1	3	11	5	16	4	2	-	55	45	20	1.62
Umballa -	941	-	-	-	-	2	1	-	-	-	-	-	-	3	-	1	-
Dugshaie -	176	-	-	-	-	2	1	1	-	-	-	-	-	4	-	1	-
Subathoo -	59	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Kussowlie -	46	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Phillour -	110	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Jullundur -	898	-	-	-	-	-	-	-	23	11	-	-	-	34	-	22	-
Ferozepoor -	740	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Meean Meer -	1,317	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Camp Kamokee -	-	-	-	-	-	-	-	-	-	24	-	-	-	24	-	14	-
Lahore Citadel -	64	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Umritsir -	361	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Govindghur -	123	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Mooltan -	233	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dera Ismael Khan -	148	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-
Kangra -	18	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sealkote -	896	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dhurramsalla -	7	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Rawul Pindee District -	1,039	-	-	-	-	4	-	2	6	-	-	-	-	12	-	8	-
Attock -	196	-	-	-	-	-	-	-	2	-	-	-	-	2	-	2	-
Nowshera -	412	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Campbellpore -	319	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Peshawur -	2,027	-	-	-	-	-	-	-	-	-	4	3	-	7	-	7	-
Muree -	114	-	-	-	-	-	-	40	4	-	-	-	-	44	-	31	-
	10,244	-	-	-	-	8	2	43	35	35	4	3	-	130	1.27	87	8.50
BENGAL PRESIDENCY -	43,371	13	47	60	91	42	92	167	112	62	20	26	6	738	1.68	401	9.16

EUROPEAN TROOPS, 1858—continued.

TABLE showing the Causes of Death and Invaliding.

TOTAL LOSS TO THE SERVICE BY DEATH AND INVALIDING, 6771. PER 1,000 OF AVERAGE STRENGTH, 154.66.						
NUMBER OF MEN LOST TO THE SERVICE BY INVALIDING, 1,908.			NUMBER OF MEN LOST TO THE SERVICE BY DEATH, 4,863.			
CAUSES OF INVALIDING.	Number Invalided.	Invalided per 1,000 of Strength.	CAUSES OF DEATH.	Died in Hospital.	Died out of Hospital.	Died per 1,000 of Strength.
Tonsillitis - - - - -	1	æ	Variola - - - - -	75	-	1.71
Febris intermittens - - - - -	122	5.41	Varicella - - - - -	1	-	-
" remittens - - - - -	19		Morbili - - - - -	2	-	-
" continua - - - - -	96		Tonsillitis - - - - -	3	-	-
Morbi oculorum - - - - -	61	1.39	Febris intermittens - - - - -	81	-	18.57
Dysenteria et diarrhoea - - - - -	248	5.66	" remittens - - - - -	223	-	
Rheumatismus - - - - -	191	4.36	" continua - - - - -	509	-	
Syphilis - - - - -	38	1.01	Ophthalmia - - - - -	2	-	-
Stricture urethrae - - - - -	6		Erysipelas - - - - -	7	-	-
Scorbutus - - - - -	3		Erythema - - - - -	1	-	-
Anasarca - - - - -	3	-	Gangrena - - - - -	2	-	-
Scrofula - - - - -	7	-	Phagedæna - - - - -	1	-	-
Phthisis pulmonalis - - - - -	58	1.39	Anthrax - - - - -	1	-	-
Hæmoptysis - - - - -	3		Phlegmon - - - - -	1	-	-
Morbus Coxæ - - - - -	2		Dysenteria - - - - -	1,188	-	27.14
Apoplexia - - - - -	11	.57	Diarrhoea - - - - -	286	-	6.53
Paralysis - - - - -	14		Cholera - - - - -	401	5	9.27
Delirium tremens - - - - -	1		Rheumatismus - - - - -	13	-	-
Mania - - - - -	8	.55	Syphilis - - - - -	9	-	-
Dementia - - - - -	15		Bubo - - - - -	2	-	-
Melancholia - - - - -	1		Stricture urethrae - - - - -	2	-	-
Epilepsia - - - - -	15	.34	Scorbutus - - - - -	3	-	-
Cephalæa - - - - -	6		Ebriositas - - - - -	6	3	-
Vertigo - - - - -	1		Anæmia - - - - -	1	-	-
Amaurosis - - - - -	2	-	Anasarca - - - - -	3	-	-
Otitis - - - - -	2	-	Scirrhomæ - - - - -	1	-	-
Dyscœcæ - - - - -	3	-	Tumor - - - - -	1	-	-
Neuralgia - - - - -	1	-	Scrofula - - - - -	1	-	-
Pericarditis - - - - -	2	-	Phthisis pulmonalis - - - - -	96	-	2.19
Morbus cordis - - - - -	53	1.85	Hæmoptysis - - - - -	6	-	-
Palpitatio - - - - -	24		Encephalitis - - - - -	6	-	-
Aneurisma - - - - -	2		Apoplexia - - - - -	778	163	21.50
Varix - - - - -	5	-	Paralysis - - - - -	8	-	-
Epistaxis - - - - -	1	-	Chorea - - - - -	1	-	-
Bronchitis - - - - -	59	1.58	Delirium tremens - - - - -	28	-	.64
Pleuritis - - - - -	2		Mania - - - - -	3	-	-
Pneumonia - - - - -	6		Dementia - - - - -	2	-	-
Dyspnœa - - - - -	2	-	Epilepsia - - - - -	1	-	-
Pharyngitis - - - - -	1	-	Tetanus - - - - -	2	-	-
Hernia - - - - -	6	-	Cephalæa - - - - -	1	-	-
Dyspepsia - - - - -	17	-	Morbus cordis - - - - -	18	-	-
Hæmorrhoids - - - - -	5	-	Aneurisma - - - - -	1	4	.41
Fistula in ano - - - - -	1	-	Epistaxis - - - - -	1	-	-
Splenitis - - - - -	24	4.66	Laryngitis - - - - -	1	-	-
Hepatitis - - - - -	204		Catarrhus - - - - -	33	-	2.35
Icterus - - - - -	1		Bronchitis - - - - -	22	-	
Ascites - - - - -	7	Pneumonia - - - - -	27	-		
Nephritis - - - - -	3	-	Pleuritis - - - - -	16	-	-
Ischuria - - - - -	1	-	Asthma - - - - -	2	-	-
Hæmaturia - - - - -	1	-	Dyspnœa - - - - -	2	-	-
Fistula in perineo - - - - -	1	-	Gastritis - - - - -	7	-	-
Varicocele - - - - -	1	-	Enteritis - - - - -	5	-	-
Orchitis - - - - -	2	-	Peritonitis - - - - -	13	-	-
Periostitis - - - - -	4	-	Hæmorrhoids - - - - -	1	-	-
Necrosis - - - - -	2	-	Colica - - - - -	4	-	-
Caries - - - - -	1	-	Hæmatemesis - - - - -	1	-	-
Contractura - - - - -	8	-	Fistula in ano - - - - -	1	-	-
Exostosis - - - - -	1	-	" perineo - - - - -	1	-	-
Paronychia - - - - -	1	-	Splenitis - - - - -	1	-	-
Abscessus - - - - -	6	-	Hepatitis - - - - -	256	-	5.84
Ulcus - - - - -	11	-	Icterus - - - - -	7	-	
Tumor - - - - -	2	-	Ascites - - - - -	4	-	
Morbi cutis - - - - -	1	-	Nephritis - - - - -	1	-	-
Debilitas (worn out) - - - - -	88	-	Cystitis - - - - -	1	-	-
Ambustio - - - - -	1	-	Orchitis - - - - -	1	-	-
Luxatura - - - - -	2	-	Hydrocele - - - - -	1	-	-
Subluxatio - - - - -	1	-	Synovitis - - - - -	1	-	-
Fractura - - - - -	11	6.00	Ulcus - - - - -	3	-	-
Contusio - - - - -	9		Abscessus - - - - -	7	-	-
Concussio cerebri - - - - -	1		Asthénia et atrophia - - - - -	13	-	-
Vulnus sclopetarium - - - - -	185	-	Ambustio - - - - -	32	-	10.67
" incisum - - - - -	27	-	Amputatio - - - - -	6	-	
Amputatio - - - - -	24	-	Fractura - - - - -	5	-	
Causes not specified - - - - -	153	-	Contusio - - - - -	4	-	-
			Concussio - - - - -	1	-	-
			" cerebri - - - - -	2	-	-
			Accident - - - - -	-	25	196
			Killed in Action - - - - -	-	-	
			Died of Wounds - - - - -	140	-	
			Drowned - - - - -	-	49	-
			Suicide - - - - -	-	7	-
			Found dead; cause of death unknown - - - - -	-	10	-
			Diseases not specified - - - - -	1	-	-
Ratio per 1,000 for Invaliding from causes not specially calculated - - - - -	-	8.82	Ratio per 1,000 for Deaths from causes not specially calculated - - - - -	-	-	4.25
	1,908	43.59		4,401	462	111.07

The Causes of Death indicated in this Table are those specified in the Regimental Returns. There is reason to believe that in several instances return has been made of the original cause of admission into hospital, and not of the disease which was the immediate cause of death.

1859-1863.

1. Tables (p. 79 to 100).—Summaries for the whole or portions of the five-year period: General Statistics of Sickness and Mortality among European Soldiers, Women, and Children; the Native Army; and the Gaol Population of the Bengal Presidency.
2. Tables (p. 101 to 165).—Statements showing the Inefficiency and Loss of the European Army in each year of the period.

The STATISTICS of the ARMY for each year of the period are shown in a series of 13 Tables.

1. Shows the Sickness and Mortality of the European Army of the Presidency taken as a whole, and the prevalence of the chief diseases in each month of the year.
2. Shows the Statistics of that portion of the Army which has been stationed in Bengal Proper during the year.
3. The Statistics of the Behar Provinces, Benares, and Oude.
4. The Statistics of the Cawnpore, Rohilcund, and Meerut Districts.
5. The Statistics of the Agra District, and of Central India.
6. The Statistics of the Punjab.
7. A Comparative Statement of the Ratios of Sickness and Mortality in each of the above-mentioned Provinces.
8. The Daily Sick-rate of each Station in each month, and the Admission-rate and Death-rate of the year.
9. The Composition of the Admission-rate of each Station, and the extent to which it has been influenced by the prevalence of the chief diseases.
- 10 and 11. The distribution of Small-pox and Cholera for the year, and the prevalence of these epidemics in each month of the year.
12. The Composition of the Death-rate of each Station, and the detail of the chief diseases which have contributed to make up the sum of the total mortality.
13. The Total Loss of the Army by Death and Invaliding, and the causes of the loss of the year, shown in detail.

I. CONTENTS OF TABLES (pages 79 to 100).

SUMMARIES showing the Ratios of Sickness and Mortality for EUROPEAN SOLDIERS, WOMEN, and CHILDREN; for NATIVE TROOPS; and for PRISONERS.

EUROPEAN TROOPS.

- Table (p. 79).—1852-53 to 1856-57.—Ratios of Sickness, Mortality, and Invaliding in the European Army.
- " (p. 80).—1859 to 1863.—Ratios of Sickness, Mortality, and Invaliding in the European Army.
- " (p. 81.) " Statement showing the relative prevalence of the chief causes of sickness and mortality in the various Provinces of the Presidency in each year.
- " (p. 82.) " The Admission-rate, Sick-rate, and Death-rate for the chief Military Stations of the Presidency in each year of the period.
- " (p. 83.) " The Admission-rate of the Army for each month, and the number per cent. of the Strength inefficient from sickness in each month of each year of the period; also, the ratios indicating, on the Average of the five years, the comparative prevalence of the chief diseases in relation to the meteorological conditions of the months.

EUROPEAN ARMY, WOMEN, AND CHILDREN—NATIVE ARMY—GAOL POPULATION.

- Table (p. 84).—Comparative Statement showing the Composition of the Admission-rate and Death-rate, according to the System of Statistical Nomenclature now in use, for European Soldiers, Women, and Children; for Native Troops; and for Prisoners: the ratios for Europeans taken on the average of the four years 1860-63; for Natives, on the average of the three years 1861-63.

WOMEN.

- " (p. 85).—The causes of Admissions into Hospital, and of Deaths, among WOMEN belonging to European Regiments, for the four years 1860 to 1863; and the Annual Ratio of Sickness and Mortality from the principal Diseases on the average of the same period.

CHILDREN.

- " (p. 86).—The causes of Admissions into Hospital, and of Deaths, among CHILDREN belonging to European Regiments, for the four years 1860 to 1863; and the Annual Ratio of Sickness and Mortality from the principal Diseases on the average of the same period.

NATIVE ARMY.

Ratios of Sickness and Mortality for the NATIVE TROOPS serving in the Bengal Presidency, and in each of its Provinces, for the three years subsequent to the reorganization of the Army in 1860.

- Table (p. 88).—Ratios of Sickness and Mortality for the Native Army for the year 1861.
- " (p. 89.)— " " " " 1862.
- " (p. 90.)— " " " " 1863.

GAOLS.

Ratios of Sickness and Mortality for the GAOL POPULATION of the Bengal Presidency, shown also in relation to each Province.

- Table (p. 91).—Ratios of Sickness and Mortality for the Gaol Population for the year 1859.
- " (p. 92.) " " " " 1860.
- " (p. 93.) " " " " 1861.
- " (p. 94.) " " " " 1862.
- " (p. 95.) " " " " 1863.
- " (p. 96 to 100.)—Tabular Statements showing, in aggregate, the number of Admissions and Deaths from each Disease, as specified in the Annual Returns furnished by Batteries, Regiments, and Gaols. For European Troops the summary is given for each of the four years 1860-63; for Native Troops, for the three years 1861-63; and for Prisoners for the five years 1859-63.

EUROPEAN TROOPS, 1853-1857.

COMPARATIVE STATEMENT of the Ratios of SICKNESS, MORTALITY, and INVALIDING for the EUROPEAN TROOPS on the Strength of the *Bengal* PRESIDENCY, including the Regiments serving in *Burmah* and *Pegu* during the Five Years previous to 31st March 1857.

DISEASES.	1852-53.						1853-54.						1854-55.						1855-56.						1856-57.						
	Admitted per Cent. of Average Strength.	Died per Cent. of Admissions.	1,000 of Average Strength.	Invalided per 1,000 of Average Strength.	Average Strength.	Admitted per Cent. of Average Strength.	Died per Cent. of Admissions.	1,000 of Average Strength.	Invalided per 1,000 of Average Strength.	Average Strength.	Admitted per Cent. of Average Strength.	Died per Cent. of Admissions.	1,000 of Average Strength.	Invalided per 1,000 of Average Strength.	Average Strength.	Admitted per Cent. of Average Strength.	Died per Cent. of Admissions.	1,000 of Average Strength.	Invalided per 1,000 of Average Strength.	Average Strength.	Admitted per Cent. of Average Strength.	Died per Cent. of Admissions.	1,000 of Average Strength.	Invalided per 1,000 of Average Strength.	Average Strength.	Admitted per Cent. of Average Strength.	Died per Cent. of Admissions.	1,000 of Average Strength.	Invalided per 1,000 of Average Strength.		
Cholera	339	3672	4246	-	-	-	197	6100	4200	-	-	46	5054	235	-	-	-	-	-	-	616	5362	3305	-	-	-	21,304	5862	3305	-	-
Small-pox	23	2653	62	-	-	-	13	2414	32	-	-	66	1539	40	-	-	-	-	-	-	12	2000	24	-	-	-	880	2000	24	-	-
Fever	11737	98	4150	101	121	121	8141	77	628	415	415	9904	119	1182	415	415	58	847	588	70	15267	49	751	405	405	27869	49	751	405	405	
Dysentery	1517	1080	4689	369	435	435	905	1181	4069	312	435	973	1584	4941	215	215	847	825	186	186	998	1053	4051	202	202	202	1053	4051	202	202	
Diarrhea	1218	279	340	369	435	435	1235	252	312	265	265	1739	234	404	215	215	301	433	186	186	1687	220	370	202	202	1687	220	370	202	202	
Hepatitis	568	540	307	245	245	245	534	496	265	265	245	616	697	429	384	384	415	256	297	297	708	471	384	423	423	708	471	384	423	423	
Ophthalmia	589	-	-	158	158	158	447	-	-	-	144	502	-	-	70	70	-	-	144	144	454	-	-	-	122	454	-	-	-	-	-
Rheumatism	1090	-	-	465	465	465	1040	-	-	-	553	1030	-	-	339	339	-	-	339	339	990	-	-	-	581	990	-	-	-	-	-
Veneral diseases	2036	-	-	48	48	48	1389	-	-	-	421	1770	-	-	69	69	-	-	69	69	1495	-	-	-	127	1495	-	-	-	-	-
Phthisis pulmonalis	50	4272	211	34	34	34	40	5116	205	205	37	43	5059	245	60	60	48	4021	496	424	62	3560	221	408	408	62	3560	221	408	408	
Heat apoplexy	40	5904	235	-	-	-	38	5783	223	223	-	69	6304	434	-	-	25	7300	476	-	43	6413	277	-	-	43	6413	277	-	-	-
Delirium tremens	57	1250	72	-	-	-	52	1062	56	56	-	62	1440	89	-	-	36	1268	45	-	40	1512	61	-	-	40	1512	61	-	-	-
Epilepsy	39	-	-	43	43	43	38	-	-	-	60	46	-	-	40	40	53	-	55	55	49	-	-	-	56	49	-	-	-	-	-
Respiratory diseases	800	233	487	496	496	496	790	188	449	449	453	793	101	80	435	435	911	193	456	456	936	191	478	438	438	936	191	478	438	438	
Abscess and ulcer	764	-	-	-	-	-	674	-	-	-	98	1358	-	-	-	-	1344	-	-	-	1182	-	-	-	-	1182	-	-	-	-	-
Wounds and accidents	783	-	-	404	404	404	646	-	-	-	98	812	-	-	70	70	956	-	400	400	797	-	-	-	80	797	-	-	-	-	-
All other diseases	2282	-	537	970	970	970	2739	192	525	525	1084	2445	157	384	947	947	2490	135	432	432	2533	171	432	432	432	2533	171	432	432	432	
	23932	-	5986	2790	2790	2790	18868	-	4664	4664	2548	22214	-	5003	2894	2894	22467	-	3344	3344	27869	-	7004	7004	7004	27869	-	7004	7004	7004	7004

Note.—The words and figures printed in italics were printed in red in the original.

TABLE showing in a Comparative Form, the Extent of the PREVALENCE of the PRINCIPAL DISEASES, and the LOSS BY DEATH from the CHIEF CAUSES OF MORTALITY in each Year of the FIVE-YEAR PERIOD 1859-63, in the various PROVINCES of the BENGAL PRESIDENCY.

PROVINCE.	Daily Sick per Cent. of Average Strength.	Admitted per Cent. of Average Strength.	ADMITTED INTO HOSPITAL PER CENT. OF AVERAGE STRENGTH.										Died in Hospital per 1,000 of Average Strength.	DIED IN HOSPITAL PER 1,000 OF AVERAGE STRENGTH.									
			Cholera.	Heat Apoplexy.	Fevers.	Dysentery.	Diarrhea.	Hepatitis.	Ophthalmia.	Rheumatism.	Veneral Diseases.	Diseases of the Respiratory Organs.		Cholera.	Small-pox.	Heat Apoplexy.	Fevers.	Dysentery.	Diarrhea.	Hepatitis.	Phthisis Pul- monalis.	Respiratory Diseases.	Delirium Tremens.
BENGAL PROPER	1859	188.25	4.35	.22	60.83	9.79	17.66	3.19	5.00	6.12	27.31	8.00	50.98	.18	1.04	5.39	9.74	9.83	1.57	.87	.87	1.04	.96
	1860	217.77	2.78	.23	77.38	10.76	23.94	4.61	4.83	8.52	34.36	7.66	39.04	.00	2.16	5.82	8.20	.22	3.02	.65	.98	1.08	.96
	1861	209.30	1.35	.19	58.80	15.13	25.59	4.85	6.97	10.00	29.68	7.67	30.09	.00	1.08	4.61	7.86	.54	3.79	1.62	.81	.51	.71
	1862	149.41	.73	.20	46.28	4.76	13.75	4.85	3.29	7.04	26.25	6.23	26.45	.00	2.85	3.25	2.44	.40	2.84	3.66	2.03	1.22	1.62
	1863	170.84	.48	.16	59.17	10.04	12.25	6.18	3.96	7.34	19.65	9.25	20.60	.53	1.06	3.47	4.74	.53	1.06	.53	.53	2.11	.84
DINAPORE, BENARES, AND OUDE	1859	239.03	1.12	.75	80.00	18.13	17.57	7.84	12.49	7.11	46.73	6.75	50.21	.05	2.80	8.52	16.57	2.57	6.92	1.60	1.15	.63	3.55
	1860	226.64	3.28	.49	86.04	9.98	11.64	7.89	8.00	7.34	44.92	6.34	44.28	.27	2.75	5.42	4.71	1.07	3.92	1.95	.89	1.07	8.20
	1861	161.00	.26	.15	43.11	5.81	8.94	6.32	6.16	7.90	38.40	6.84	17.50	.44	.84	2.27	2.38	.62	2.69	1.97	1.45	.84	3.01
	1862	151.56	.11	.02	44.16	4.59	8.56	4.74	5.52	9.18	32.69	6.42	13.97	.11	.00	3.35	2.12	.11	3.02	1.34	1.01	.22	2.57
	1863	157.62	1.12	.13	47.57	4.51	9.61	5.95	5.0	9.08	30.10	6.88	21.74	.23	.58	1.40	1.51	.23	4.62	1.85	1.15	.23	2.31
CAWNPORE AND MEERUT	1859	240.00	3.46	1.28	80.43	12.80	17.75	8.21	8.88	7.58	35.66	8.07	57.78	.33	7.20	6.61	9.13	3.01	4.77	1.67	.58	.83	4.18
	1860	211.50	1.73	.79	69.27	6.79	13.86	6.62	7.66	8.38	32.54	7.27	37.62	.14	3.08	5.70	4.71	1.90	4.84	1.72	.99	.63	3.98
	1861	210.59	3.31	.15	51.03	7.60	19.08	8.43	7.81	9.66	51.58	8.16	50.30	.08	1.68	6.04	4.96	3.36	3.17	2.37	1.58	.50	2.27
	1862	184.19	.59	.22	58.07	5.11	12.12	7.54	7.02	9.87	37.09	6.76	22.33	.00	1.10	2.76	2.96	1.10	3.97	1.73	.92	.82	3.26
	1863	163.45	.87	.25	46.23	4.59	10.46	5.73	5.46	9.35	32.89	7.34	28.78	.65	1.30	2.60	2.83	1.30	4.46	2.82	.76	.54	3.91
AGRA AND CENTRAL INDIA	1859	285.00	1.02	1.22	153.65	10.69	21.11	6.14	8.20	5.37	30.53	10.29	44.05	.20	5.35	9.16	9.67	3.31	5.85	.51	2.03	1.02	3.81
	1860	262.79	6.57	1.90	125.65	7.32	18.74	6.05	9.78	7.21	34.60	9.61	63.13	.18	6.10	1.72	6.45	1.25	3.76	1.25	1.07	.72	3.75
	1861	295.08	6.04	.31	156.95	5.75	19.81	4.41	7.23	9.60	34.94	9.72	66.15	.90	1.44	7.60	4.15	3.07	2.16	.90	1.80	.36	2.53
	1862	267.63	3.86	.26	150.71	5.44	13.32	6.91	4.85	9.52	31.97	6.48	47.52	.19	2.02	5.54	2.95	.92	2.77	1.66	1.29	.37	2.95
	1863	190.15	.60	.18	73.82	5.98	10.91	5.33	3.84	11.25	34.17	8.32	21.85	.18	1.09	3.64	3.10	.55	3.64	.91	1.46	.73	2.73
PUNJAB	1859	177.23	.07	.75	64.58	3.97	10.38	4.58	4.63	10.22	27.09	8.65	20.18	.00	1.00	3.68	2.93	.81	2.87	2.00	.56	.37	2.43
	1860	155.72	.04	.23	44.34	4.71	9.76	5.22	7.47	8.01	25.23	9.22	14.20	.18	.97	2.23	2.56	.25	2.01	1.28	.73	.42	2.32
	1861	189.21	5.66	.28	74.45	4.11	13.43	4.93	5.42	7.36	28.10	8.03	51.45	.82	1.45	2.20	2.20	1.01	2.83	1.20	1.07	.19	2.38
	1862	210.25	2.28	.23	97.20	4.24	12.46	5.97	5.54	7.32	28.24	7.11	27.75	.00	1.38	3.01	2.38	1.00	2.45	1.45	.69	.19	2.44
	1863	206.99	.01	.30	107.57	3.89	8.08	7.07	4.88	8.21	22.67	6.38	18.14	.13	1.28	3.45	3.19	.89	2.74	1.92	.77	.32	3.45

Note.—The words and figures printed in *italics* were printed in red in the original.

EUROPEAN TROOPS, 1859-63—continued.

COMPARATIVE STATEMENT of the ratios of SICKNESS and MORTALITY among the EUROPEAN TROOPS cantoned in the PRINCIPAL MILITARY STATIONS of the BENGAL PRESIDENCY, during the FIVE YEARS 1859-63.

PROVINCE.	STATION.	DAILY SICK PER CENT. OF THE AVERAGE STRENGTH.					ADMITTED INTO HOSPITAL PER CENT. OF STRENGTH.					DIED PER 1,000 OF THE AVERAGE STRENGTH.									
		1859.	1860.	1861.	1862.	1863.	1859.	1860.	1861.	1862.	1863.	1859.		1860.		1861.		1862.		1863.	
												All Causes.	Cholera.	All Causes.	Cholera.	All Causes.	Cholera.	All Causes.	Cholera.	All Causes.	Cholera.
BENGAL PROPER.	Fort William	6.56	8.91	7.95	7.16	7.40	164.07	234.06	234.90	161.36	173.14	25.94	6.87	51.75	33.39	24.78	8.52	35.23	14.77	22.82	5.37
	Dum-Dum	7.36	6.68	7.22	—	7.30	223.52	205.80	247.70	—	116.20	85.04	47.80	39.75	4.83	30.00	4.98	—	—	12.53	1.54
	Barrackpore	6.63	8.70	8.67	6.10	4.41	185.22	234.31	176.33	119.29	169.02	44.82	25.24	59.00	8.00	35.93	5.26	16.63	—	20.50	2.25
	Berhampore	6.16	8.93	6.00	5.07	7.75	190.34	250.74	185.82	114.18	201.33	60.09	17.11	44.44	—	24.82	—	20.27	3.38	22.14	—
	Hazarebaugh	9.04	8.76	12.53	3.54	9.30	329.73	197.25	253.20	69.03	172.06	35.13	2.70	40.31	1.72	47.73	—	17.25	.94	24.92	4.11
DINAPORE, BENARES AND OUDE.	Dinapore	11.53	11.69	6.00	7.94	6.30	259.22	260.09	183.27	192.36	160.32	62.58	5.27	46.22	9.02	26.76	2.55	45.27	—	11.59	8.24
	Benares and Raighat	11.16	13.14	8.68	6.48	7.91	268.67	362.26	232.16	135.55	202.98	72.24	49.77	73.94	2.80	49.55	4.46	43.14	—	42.15	28.93
	Gorakhpore	9.93	6.80	8.16	11.48	—	220.45	205.16	165.49	220.92	—	44.78	—	34.39	1.35	19.55	—	55.90	—	—	—
	Gondah	7.00	7.10	7.16	6.37	5.28	174.00	157.82	105.00	240.53	122.58	46.79	—	24.87	18.65	18.46	—	5.08	—	12.27	—
	Fyzabad	8.90	9.39	7.72	6.78	7.13	195.00	194.59	166.43	120.57	198.41	55.88	2.23	33.24	19.00	4.49	.89	5.58	—	13.93	—
	Rae Bareilly	—	9.74	5.57	5.11	3.87	221.27	157.87	84.26	127.10	68.65	39.57	4.00	24.69	1.14	42.34	—	3.41	—	7.46	—
	Lucknow	10.76	10.42	7.01	8.55	5.20	253.70	193.32	139.45	170.38	147.42	48.50	12.65	31.14	9.93	14.00	1.35	15.29	—	28.51	10.55
	Settapore	9.63	7.64	8.21	7.92	5.20	202.11	142.92	147.65	162.54	127.19	29.57	—	48.66	2.95	14.66	—	8.25	—	6.76	—
	Allahabad	8.19	8.80	9.38	9.03	9.01	265.45	255.81	244.87	217.34	167.24	103.43	51.52	46.34	10.97	47.77	16.44	48.97	—	78.75	41.75
	Cawnpore	10.86	12.77	10.00	6.04	5.94	300.08	275.24	211.70	164.65	137.78	98.40	39.36	54.55	19.51	60.16	28.45	44.30	—	39.59	20.65
CAMPBELL AND MEERUT.	Futteeighur	8.28	7.89	7.83	10.20	8.82	192.20	213.99	131.57	182.88	128.04	44.85	—	40.36	—	23.04	11.52	18.22	—	8.82	—
	Shahjehanpore	6.54	7.61	7.75	7.36	5.94	113.37	110.58	86.10	112.45	103.15	4.45	—	24.83	4.00	7.62	—	9.43	5.66	43.00	—
	Bareilly	6.54	5.25	7.60	4.38	6.11	141.67	100.59	155.97	93.00	119.10	18.22	1.21	31.38	5.58	14.31	4.21	5.47	—	13.10	—
	Roorkee	—	6.94	6.62	7.20	5.11	—	212.86	183.00	177.25	127.23	—	—	20.31	—	8.50	4.70	19.64	—	44.92	—
	Moradabad	5.40	7.23	11.76	9.58	7.33	87.00	117.28	117.12	207.24	152.67	22.72	—	25.92	—	28.32	4.36	9.34	—	7.63	—
	Meerut	9.63	7.26	9.02	7.75	7.16	252.70	168.32	135.98	180.54	154.25	23.30	—	42.08	—	59.17	34.32	28.95	15.70	13.34	—
	Delhi	8.93	10.84	12.19	12.65	8.65	224.93	223.90	256.10	221.19	256.93	27.14	—	29.87	.93	94.94	44.36	25.30	—	35.65	—
	Muttra	7.88	8.47	8.80	9.76	6.71	201.23	229.61	238.90	204.18	171.25	14.81	—	89.38	67.04	23.06	17.53	8.00	—	10.33	—
	Agra	8.61	7.96	12.23	9.11	5.75	251.27	217.85	367.94	249.18	176.32	23.52	—	72.70	47.66	85.25	56.56	55.31	42.50	34.98	18.83
	Morar	6.83	9.12	8.05	6.96	6.00	253.17	277.79	287.43	228.33	179.95	35.59	—	106.33	68.02	479.02	137.43	69.66	37.21	19.30	—
AGRA AND CENTRAL INDIA.	Jhansi	—	9.45	11.31	8.50	8.50	—	354.54	308.35	339.92	179.24	—	—	102.92	22.30	32.10	—	8.83	—	27.91	—
	Nowgong	—	—	6.66	8.36	6.51	—	—	190.42	238.64	225.11	—	—	18.62	4.44	9.30	—	8.00	—	17.75	—
	Saugor	—	10.46	9.03	10.22	7.26	—	217.87	247.10	270.79	218.93	—	—	48.62	4.44	9.30	—	18.03	—	17.75	—
	Nagode	—	8.15	7.72	7.62	6.39	—	254.66	222.16	374.58	158.74	—	—	97.77	66.66	10.00	—	4.24	—	14.02	—
	Jubbulpore	—	10.21	8.82	8.15	8.32	—	281.74	273.40	260.68	211.83	—	—	28.57	6.21	18.58	—	23.61	—	20.73	—
	Umballa	7.20	6.42	8.00	6.34	5.35	166.00	136.41	254.80	214.32	140.70	14.54	—	14.27	—	45.60	29.12	7.36	4.13	41.29	.62
	Dugshae	9.54	8.00	4.48	6.56	6.00	175.10	78.14	38.02	96.45	62.55	21.20	—	6.90	—	8.53	—	16.41	—	16.97	—
	Subathoo	6.38	8.58	7.96	5.68	6.11	71.75	122.82	102.84	107.41	137.95	47.72	—	7.05	—	18.62	—	9.88	—	24.42	—
	Jullundur	7.04	4.22	3.92	5.49	5.00	174.41	122.79	87.30	168.15	137.36	10.70	—	9.21	—	10.84	—	12.02	—	7.62	—
	Rozepore	5.46	4.52	6.32	5.48	4.89	125.70	115.19	169.64	133.30	98.92	14.02	—	9.21	.92	11.25	4.12	49.65	4.14	16.34	—
PUNJAB.	Mooltan	6.08	7.79	8.73	8.15	6.29	230.00	216.74	209.40	329.37	260.55	22.30	—	26.51	—	27.11	24.56	77.09	49.98	10.27	—
	Meen Meer	7.67	6.88	7.30	7.34	6.34	235.61	164.93	236.00	237.36	134.85	38.65	—	21.00	.98	49.47	85.24	41.35	49.98	10.27	—
	Umrutser	6.50	4.34	6.03	5.83	7.58	91.90	80.63	215.80	198.68	187.04	34.40	—	6.98	—	116.42	6.94	43.88	6.94	73.35	—
	Skalkote	6.56	7.20	7.32	5.08	8.59	128.19	192.77	190.00	151.88	167.88	10.62	—	10.84	—	8.70	—	15.71	—	5.45	—
	Rawul Pindie	4.90	5.34	5.73	7.86	7.78	135.90	150.77	150.87	254.05	188.92	7.30	—	14.39	—	11.90	—	9.70	2.77	9.10	—
	Nowsheera	6.71	5.70	5.07	5.26	4.84	147.00	187.80	164.10	161.22	126.10	14.26	—	7.39	—	6.21	—	9.70	2.77	9.10	—
	Peshawar	6.18	5.66	7.06	7.56	8.55	203.56	179.04	290.43	292.60	428.90	15.15	—	12.08	—	12.27	—	62.94	49.24	16.86	—

Note.—The words and figures printed in italics were printed in red in the original.

TABLE of Ratios showing the NUMBER INEFFICIENT PER CENT. OF STRENGTH in each MONTH of the period; and indicating the extent to which the CHIEF DISEASES and CAUSES of MORTALITY in the EUROPEAN ARMY, have prevailed in each MONTH of the YEAR, on the average of the five years 1859-63.

FIVE YEARS 1859-63.													
	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	For the Year.
1859 - - - - -	7-70	7-82	8-31	9-20	9-64	10-05	10-00	9-85	9-38	9-31	9-08	7-60	9-03
1860 - - - - -	7-44	7-33	7-90	8-45	8-30	8-68	8-94	9-35	9-70	8-74	7-58	6-89	8-39
1861 - - - - -	6-81	6-91	7-29	8-19	8-62	8-40	8-79	9-57	10-01	9-00	7-71	6-79	8-20
1862 - - - - -	6-64	6-75	6-91	7-48	7-72	7-58	7-90	8-73	8-74	8-77	8-12	6-56	7-68
1863 - - - - -	6-27	6-21	6-07	6-51	7-39	7-35	7-77	8-37	8-47	7-49	6-30	5-17	6-96
1859-63 - - - - -	7-01	7-05	7-37	8-07	8-43	8-54	8-79	9-23	9-25	8-71	7-83	6-66	8-12
1859 - - - - -	14-06	13-53	18-11	19-91	21-38	20-71	21-95	19-33	17-57	20-38	19-15	15-01	222-85
1860 - - - - -	13-32	11-98	15-40	19-12	17-83	18-81	19-03	21-15	20-05	18-14	15-81	14-27	203-15
1861 - - - - -	13-59	11-56	12-79	19-18	15-41	14-60	21-46	21-25	22-00	22-67	15-74	13-70	204-56
1862 - - - - -	12-22	11-01	12-01	17-82	14-85	15-31	20-71	20-15	18-26	23-52	17-22	14-00	197-08
1863 - - - - -	11-80	9-53	10-81	15-31	14-34	14-62	20-66	17-95	19-68	21-13	15-11	12-86	183-84
1859-63 - - - - -	13-05	11-62	14-15	18-37	17-06	17-09	20-75	19-95	19-45	21-11	16-77	14-12	203-96
Revers - - - - -	1-77	2-04	3-21	6-10	6-24	7-03	8-25	7-42	9-05	10-74	7-70	4-88	75-60
Dysentery - - - - -	-41	-38	-47	-63	-60	-53	-70	-96	-95	-73	-54	-47	7-40
Diarrhoea - - - - -	-64	-61	-92	-126	-107	-94	-189	-226	-140	-96	-76	-72	13-54
Hepatitis - - - - -	-45	-43	-46	-55	-55	-57	-64	-61	-60	-61	-44	-44	6-36
Ophthalmia - - - - -	-54	-59	-74	-82	-60	-49	-54	-53	-52	-57	-45	-43	6-88
Rheumatism - - - - -	-80	-70	-74	-70	-59	-63	-79	-74	-69	-74	-65	-71	8-48
Respiratory Diseases - - - - -	-77	-67	-72	-70	-65	-52	-64	-53	-49	-62	-72	-65	7-67
Fevers - - - - -	3-55	2-69	4-22	8-84	8-61	9-71	11-32	9-96	11-94	13-88	9-71	6-07	100-00
Dysentery - - - - -	5-43	5-06	6-31	8-81	8-49	7-52	9-80	13-23	12-76	9-62	6-95	6-02	100-00
Diarrhoea - - - - -	4-60	4-50	6-72	9-62	8-23	7-27	14-51	16-95	10-33	6-94	5-85	4-98	100-00
Hepatitis - - - - -	6-91	6-76	7-13	8-96	9-09	9-29	10-47	9-67	9-36	9-41	6-49	6-46	100-00
Ophthalmia - - - - -	7-72	8-64	10-81	12-35	9-09	7-51	8-14	7-89	7-56	8-10	6-21	5-96	100-00
Rheumatism - - - - -	9-15	8-22	8-69	8-57	7-30	7-76	9-64	8-85	8-10	8-52	7-82	7-88	100-00
Respiratory Diseases - - - - -	9-72	8-71	9-28	9-42	8-80	7-22	8-59	7-03	6-35	7-90	8-94	8-04	100-00
Phthisis Pulmonalis* - - - - -	6-13	5-31	6-28	9-34	9-12	9-57	12-86	12-11	10-69	8-80	5-23	4-56	100-00
Small-pox - - - - -	20-62	6-19	13-40	20-62	21-65	8-25	4-12	-	-	-	2-06	3-09	100-00
Cholera - - - - -	-18	1-14	4-50	8-22	5-90	2-83	15-62	4-13	10-17	3-24	7-0	-37	100-00
Heat Apoplexy - - - - -	-	-40	-	3-16	12-62	39-25	23-26	8-29	6-51	2-37	1-18	1-18	100-00
Fevers - - - - -	3-27	1-83	4-14	9-24	10-97	9-82	10-01	11-65	13-47	14-53	7-30	3-85	100-00
Dysentery - - - - -	5-37	3-19	5-04	9-49	8-98	7-39	7-98	13-77	14-95	10-83	6-14	7-67	100-00
Diarrhoea - - - - -	5-83	3-07	4-29	10-12	7-67	6-44	8-28	14-11	14-42	11-96	10-12	9-05	100-00
Hepatitis - - - - -	6-23	5-88	5-88	8-12	5-06	6-59	8-24	10-00	11-18	13-65	10-12	12-96	100-00
Respiratory Diseases - - - - -	14-23	9-62	3-77	7-53	7-95	8-37	5-02	5-02	6-70	12-55	6-28	12-96	100-00
Phthisis Pulmonalis - - - - -	7-16	5-31	6-47	8-31	7-16	8-31	10-62	10-62	9-24	9-47	9-24	8-08	100-00
Delirium Tremens - - - - -	2-96	1-48	5-18	7-41	11-11	17-78	8-89	8-15	14-81	10-37	5-93	5-93	100-00

* Re-admissions of Invalids not included.

EUROPEAN SOLDIERS, WOMEN, AND CHILDREN—NATIVE ARMY—GAOL POPULATION.
COMPARATIVE STATEMENT of the ADMISSION-RATES and DEATH-RATES for EUROPEAN SOLDIERS, and WOMEN and CHILDREN of European Regiments, for NATIVE Troops, and for PRISONERS, arranged according to the system of Statistical Classification now in use, for European Soldiers, Women, and Children, the ratios taken on the Average of the years 1860-63; for Natives, on the Average of the Three Years 1861-63.

ADMITTED INTO HOSPITAL PER CENT. OF THE AVERAGE STRENGTH.										DIED IN HOSPITAL PER 1,000 OF AVERAGE STRENGTH.													
CLASSES (OF DISEASE.	Europeans.				ORDERS OF DISEASE.	DISEASES AND GROUPS OF DISEASES.				Europeans.				Natives.				Europeans.		Natives.			
	Fighting Men.	Women.	Children.	Prisoners.						Fighting Men.	Women.	Children.	Prisoners.	Fighting Men.	Children.	Prisoners.	Fighting Men.	Fighting Men.	Women.	Children.	Fighting Men.	Prisoners.	
Class I. Zymotic -	142.06	76.85	69.17	99.30	97.63	Order 1. Miasmatic -				109.11	76.31	68.37	91.43										
						Order 2. Enthetic -				31.23	12	.05	5.76	2.40									
						Order 3. Dietic -				1.02	.15	.07	.14	.67									
						Order 4. Parasitic -				.70	.27	.68	1.32	3.13									
Class II. Constitutional -	1.25	1.73	1.08	.33	1.23	Order 2. Tubercular -				1.04	.99	.59	.17	.48									
						Order 1. Diathetic -				.21	.74	.49	.16	.75									
						Order 1. Nervous -				3.55	2.22	2.40	1.38	1.98									
						Order 2. Circulatory -				.99	.33	.07	.06	.09									
Class III. Local -	37.32	20.82	9.04	22.72	29.97	Order 3. Respiratory -				5.24	2.99	2.95	2.70	3.29									
						Order 4. Digestive -				13.94	11.00	1.35	4.70	7.10									
						Order 5. Urinary -				.54	.25	.14	.16	.20									
						Order 6. Generative -				1.60	.86	—	.24	.19									
Class IV. Developmental -	.96	25.64	5.40	1.64	1.24	Order 7. Locomotive -				.80	.10	.05	.29	.37									
						Order 8. Integumentary -				10.66	3.07	2.08	13.19	16.75									
						Orders 1 and 2. —				—	21.65	3.22	—	—									
						Orders 3 and 4. —				.96	3.99	2.18	1.64	1.24									
Class V. Violence -	8.48	1.93	1.11	9.74	4.17	Debility, atrophy, and old age -				8.38	1.93	1.11	9.61	4.17									
						Accident -				.10	—	—	.13	.19									
						Punished -				.49	.70	.13	.19	.19									
						Disease not specified -				190.56	127.67	85.93	133.92	134.26									
190.56				127.67						190.56	127.67	85.93	133.92	134.26									
.49				.70	.13	.19	.02			.49	.70	.13	.19	.19									
.96				25.64	5.40	1.64	1.24			.96	3.99	2.18	1.64	1.24									
8.48				1.93	1.11	9.74	4.17			8.38	1.93	1.11	9.61	4.17									
37.32				20.82	9.04	22.72	29.97			13.94	11.00	1.35	4.70	7.10									
5.24				2.99	2.95	2.70	3.29			5.24	2.99	2.95	2.70	3.29									
.99				.33	.07	.06	.09			.99	.33	.07	.06	.09									
1.04				.99	.59	.17	.48			1.04	.99	.59	.17	.48									
.70				.27	.68	1.32	3.13			.70	.27	.68	1.32	3.13									
1.02				.15	.07	.14	.67			1.02	.15	.07	.14	.67									
31.23				12	.05	5.76	2.40			31.23	12	.05	5.76	2.40									
109.11				76.31	68.37	91.43				109.11	76.31	68.37	91.43										
1.09				1.30	1.22	1.51	1.35			1.09	1.30	1.22	1.51	1.35									
6.12				7.18	16.48	3.56	16.48			6.12	7.18	16.48	3.56	16.48									
7.42				1.25	.07	4.85	2.76			7.42	1.25	.07	4.85	2.76									
1.95				2.64	2.22	10.87	14.24			1.95	2.64	2.22	10.87	14.24									
12.30				5.60	5.80	2.66	7.14			12.30	5.60	5.80	2.66	7.14									
24.30				19.48	12.98	13.73	9.31			24.30	19.48	12.98	13.73	9.31									
47.90				27.18	15.75	41	18			47.90	27.18	15.75	41	18									
13				.40	.76	.67	.31			13	.40	.76	.67	.31									
.92				.92	.65	2.76	2.76			.92	.92	.65	2.76	2.76									
2.98				2.98	4.64	7.91	1.39			2.98	2.98	4.64	7.91	1.39									
4.30				4.30	9.39	21.72	28.86			4.30	4.30	9.39	21.72	28.86									
17.35				17.35	17.35	16.34	27.1			17.35	17.35	16.34	27.1	17.35									
.08				.08	—	—	.11			.08	—	—	.11	.11									
.39				.39	—	—	.16			.39	—	—	.16	.16									
.36				.36	—	—	.11			.36	—	—	.11	.11									
.40				.40	—	—	.02			.40	—	—	.02	.02									
.01				.01	—	—	.01			.01	—	—	.01	.01									
.37				.37	—	—	.37			.37	—	—	.37	.37									
.36				.36	—	—	.36			.36	—	—	.36	.36									
.02				.02	—	—	.02			.02	—	—	.02	.02									
.18				.18	—	—	.18			.18	—	—	.18	.18									
.30				.30	—	—	.30			.30	—	—	.30	.30									
.02				.02	—	—	.02			.02	—	—	.02	.02									
.18				.18	—	—	.18			.18	—	—	.18	.18									
.75				.75	—	—	.75			.75	—	—	.75	.75									
.43				.43	—	—	.43			.43	—	—	.43	.43									
.35				.35	—	—	.35			.35	—	—	.35	.35									
.11				.11	—	—	.11			.11	—	—	.11	.11									
.48				.48	—	—	.48			.48	—	—	.48	.48									
.30				.30	—	—	.30			.30	—	—	.30	.30									
.08				.08	—	—	.08			.08	—	—	.08	.08									
.25				.25	—	—	.25			.25	—	—	.25	.25									
.38				.38	—	—	.38			.38	—	—	.38	.38									
.13				.13	—	—	.13			.13	—	—	.13	.13									
.26				.26	—	—	.26			.26	—	—	.26	.26									
.30				.30	—	—	.30			.30	—	—	.30	.30									
.30				.30	—	—	.30			.30	—	—	.30	.30									
.30				.30	—	—	.30			.30	—	—	.30	.30									
.30				.30	—	—	.30			.30	—	—	.30	.30									
.30				.30	—	—	.30			.30	—	—	.30	.30									
.30				.30	—	—	.30			.30	—	—	.30	.30									
.30				.30	—	—	.30			.30	—	—	.30	.30									
.30				.30	—	—	.30			.30	—	—	.30	.30									
.30				.30	—	—	.30			.30	—	—	.30	.30									
.30				.30	—	—	.30			.30	—												

EUROPEAN WOMEN, 1860-63.

TABLE showing the Causes of SICKNESS and MORTALITY among WOMEN belonging to EUROPEAN REGIMENTS serving in the BENGAL PRESIDENCY during the Years from 1860 to 1863, and the RATIOS of ADMISSIONS and DEATHS to the Strength on the Average of the Four Years.

DISEASES.	1860.		1861.		1862.		1863.		Average of Years 1860-63.	
	Strength - - 2,080 Treated per Cent. } 119·28 of Strength - }		Strength - - 2,293 Treated per Cent. } 141·30 of Strength - }		Strength - - 2,397 Treated per Cent. } 133·50 of Strength - }		Strength - - 2,510 Treated per Cent. } 116·61 of Strength - }		Treated per Cent. of Strength.	Died per 1,000 of Strength.
	Died per 1,000 of Strength: Cholera - 48·27 All Causes - 56·25		Died per 1,000 of Strength: Cholera - 27·91 All Causes - 68·03		Died per 1,000 of Strength: Cholera - 46·69 All Causes - 41·30		Died per 1,000 of Strength: Cholera - 7·57 All Causes - 35·06			
	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.		
Varicella - - - -	6	-	13	7	2	-	3	-	·26	·76
Varicella - - - -	1	-	-	-	-	-	1	-	-	-
Morbilli - - - -	1	-	2	-	1	-	-	-	-	-
Scarlatina - - - -	1	-	-	-	-	-	-	-	-	-
Diphtheria - - - -	1	1	-	-	-	-	-	-	-	-
Tonsillitis - - - -	15	-	10	-	9	-	21	-	-	-
Febris Intermittens	413	3	652	-	751	1	734	2	46·96	5·29
Remittens - - - -	155	9	126	11	107	-	43	1		
Continua - - - -	395	4	464	7	359	6	159	5		
Ophthalmia - - - -	136	-	183	-	174	-	173	-	7·18	-
Erysipelas - - - -	4	-	5	1	2	-	3	-	-	-
Anthrax - - - - -	-	-	-	-	-	-	1	-	-	-
Furunculus - - - -	2	-	6	-	4	-	6	-	-	-
Influenza - - - -	2	-	7	-	14	-	7	-	-	-
Dysentery - - - -	131	15	152	16	122	12	133	11	5·80	9·59
Diarrhoea - - - -	205	5	277	7	261	9	266	14	10·87	
Cholera - - - - -	60	38	105	64	58	40	22	19	2·64	17·35
Rheumatismus - - -	22	-	39	-	26	-	29	-	1·25	-
Syphilis Primaria -	-	-	-	-	1	-	1	-	-	-
Secundaria - - - -	-	-	1	-	3	-	4	-	-	-
Gonorrhoea - - - -	1	-	-	-	-	-	-	-	-	-
Scorbutus - - - -	2	1	-	-	1	-	-	-	-	-
Ebriositas - - - -	1	-	3	-	2	-	5	-	-	-
Bronchocele - - - -	-	-	1	-	-	-	-	-	-	-
Scabies - - - - -	-	-	3	-	2	-	1	-	-	-
Vermes - - - - -	1	-	-	-	1	-	2	-	-	-
Tania - - - - -	1	-	4	-	4	-	5	-	-	-
Dracunculus - - -	-	-	-	-	1	-	-	-	-	-
Anemia - - - - -	6	-	23	1	12	-	17	-	-	-
Anasarca - - - - -	5	-	1	-	2	1	1	1	-	-
Carcinoma - - - -	-	-	-	-	-	-	1	1	-	-
Scrofula - - - - -	2	-	3	-	1	-	-	-	-	-
Phthisis Pulmonalis	14	8	33	12	9	4	20	10	·82	3·77
Hæmoptysis - - - -	5	-	2	-	2	-	1	1	-	-
Apoplexia - - - -	9	6	7	6	4	2	3	1	·55	1·62
Epilepsia - - - -	1	-	5	-	4	-	4	1	-	-
Paralysis - - - -	1	1	3	-	2	1	1	-	-	-
Mania - - - - -	1	-	3	1	2	-	2	-	·12	·11
Dementia - - - - -	-	-	-	-	6	-	-	-		
Delirium Tremens -	-	-	-	-	1	-	3	-	-	-
Hysteria - - - - -	23	-	24	-	12	-	19	-	-	-
Tetanus - - - - -	-	-	1	1	1	1	-	-	-	-
Cephalæa - - - -	5	-	4	-	3	-	4	-	-	-
Neuralgia - - - -	-	-	4	-	6	-	11	-	-	-
Otitis - - - - -	7	-	5	-	7	-	7	-	-	-
Odontalgia - - - -	1	-	-	-	-	-	-	-	-	-
Pericarditis - - - -	-	-	1	-	1	-	1	-	·16	·21
Endocarditis - - -	1	-	1	-	3	2	2	-		
Aneurisma - - - -	-	-	1	-	2	-	-	-	-	-
Angina Pectoris - -	-	-	-	-	2	-	-	-	-	-
Syncope - - - - -	1	-	-	-	-	-	-	-	-	-
Palpitatio - - - -	3	-	3	-	4	-	2	-	-	-
Varix - - - - -	-	-	1	-	2	-	-	-	-	-
Laryngitis - - - -	2	1	1	-	1	-	-	-	-	-
Bronchitis - - - -	47	3	52	1	51	1	59	2	2·99	1·83
Pleuritis - - - -	3	-	5	-	5	-	7	-		
Pneumonia - - - -	6	5	8	2	7	1	5	-	-	-
Asthma - - - - -	5	-	4	-	3	1	4	-	-	-
Dyspnoea - - - -	2	-	-	-	-	-	-	-	-	-
Gastritis - - - -	6	-	4	2	8	1	3	1	-	-
Enteritis - - - -	1	1	1	-	2	1	-	-	-	-
Peritonitis - - - -	3	-	2	-	1	-	3	1	-	-
Obstipatio - - - -	19	1	18	-	6	-	11	-	-	-
Dyspepsia - - - -	55	-	79	-	73	-	129	-	-	-
Colica - - - - -	54	-	55	-	46	-	32	-	-	-
Hæmatemesis - - -	2	-	-	-	-	-	1	-	-	-
Hæmorrhoids - - - -	5	-	16	-	20	-	12	-	-	-
Fistula in Ano - -	-	-	2	-	-	-	-	-	-	-

Note.—The words and figures printed in *italics* were printed in red in the original.

EUROPEAN WOMEN, 1860-63—continued.

DISEASES.	1860.		1861.		1862.		1863.		Average of Year 1860-63.	
	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Treated per Cent. of Strength.	Died per 1,000 of Strength.
Splenitis - - - -	7	-	12	1	12	1	12	-	46	-
Hepatitis - - - -	66	5	81	5	71	4	54	3	293	7
Icterus - - - - -	4	-	6	1	9	-	10	-	-	-
Ascites - - - - -	3	2	-	-	1	-	4	-	-	-
Nephritis - - - -	3	1	3	-	3	-	3	-	-	-
Ischuria - - - - -	1	-	4	-	-	-	1	-	-	-
Hæmaturia - - - -	-	-	-	-	-	-	1	-	-	-
Cystitis - - - - -	2	-	1	-	-	-	1	-	-	-
Leucorrhœa - - - -	7	-	5	-	11	-	9	-	-	-
Ovaritis - - - - -	1	-	4	-	-	-	-	-	-	-
Hysteritis - - - -	1	1	4	1	3	-	3	-	-	-
Phlegmasia Dolens	-	-	-	-	-	-	1	-	86	-
Fistula Vaginalis -	1	-	-	-	-	-	-	-	-	-
Prolapsus Uteri - -	-	-	-	-	3	-	4	-	-	-
Tumor - - - - -	7	-	8	1	5	-	3	-	-	-
Lumbago - - - - -	3	-	1	-	-	-	-	-	-	-
Pleurodynia - - - -	-	-	2	-	-	-	-	-	-	-
Arthritis - - - - -	2	-	-	-	-	-	-	-	-	-
Synovitis - - - - -	-	-	-	-	1	-	-	-	-	-
Morbi Cutis - - - -	4	-	4	-	8	-	1	-	-	-
Phlegmon - - - - -	31	-	30	-	21	-	7	-	-	-
Paronychia - - - -	1	-	3	-	4	-	7	-	-	-
Abscessus - - - - -	7	-	12	-	31	-	20	-	289	-
Ulcus - - - - -	20	-	28	-	24	-	22	-	-	-
Partus - - - - -	239	4	426	7	504	4	503	7	1802	23
Abortus - - - - -	25	1	44	-	45	-	51	2	178	3
Paramenia - - - - -	19	-	48	-	48	1	57	2	185	3
Asthenia - - - - -	88	1	42	1	126	4	114	3	399	9
Injury - - - - -	39	-	43	-	45	-	52	-	193	-
Not specified - - -	49	-	4	-	9	-	3	-	-	-
Ratio for all Diseases not specially calculated -	-	-	-	-	-	-	-	-	1336	25
	2,481	117	3,240	156	3,200	99	2,927	58	12767	495

EUROPEAN CHILDREN, 1860-63.

TABLE showing the Causes of SICKNESS and MORTALITY among CHILDREN belonging to EUROPEAN REGIMENTS serving in the BENGAL PRESIDENCY during the Years from 1860 to 1863, and the RATIOS of ADMISSIONS and DEATHS to the Strength on the average of the Four Years.

DISEASES.	1860.		1861.		1862.		1863.		Average of Year 1860-63.	
	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Treated per Cent. of Strength.	Died per 1,000 of Strength.
Strength - - - - -	3,186		3,079		3,406		3,730			
Treated per Cent. of Strength -	79.47		90.22		93.83		80.69			
Died per 1,000 of Strength:										
Cholera - - - - -	20.72		30.53		13.21		3.75			
All Causes - - - -	102.64		91.91		91.02		78.02			
	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Treated per Cent. of Strength.	Died per 1,000 of Strength.
Variola - - - - -	24	4	25	4	-	-	6	1	210	25
Varicella - - - - -	2	-	6	1	1	-	-	-		
Morbilli - - - - -	130	19	25	1	52	2	9	1		
Scarlatina - - - -	2	1	-	-	-	-	-	-	154	25
Tonsillitis - - - -	11	1	13	1	13	-	21	1		
Diphtheria - - - -	-	-	-	-	1	-	11	8		
Parotitis - - - - -	-	-	1	-	1	-	1	-	2873	1067
Cynanche Trachealis	6	6	3	1	20	7	11	3		
Pertussis - - - - -	8	1	2	-	58	4	25	1		
Febris Intermitiens	365	10	541	7	562	10	643	10	1648	
„ Remittens - - -	120	9	93	7	113	10	66	10		
„ Continua - - - -	281	16	390	24	447	16	230	14		
Ophthalmia - - - -	454	-	629	-	587	-	538	-		

Note.—The words and figures in italics were printed in red in the original.

EUROPEAN CHILDREN, 1860-63—continued.

DISEASES.	1860.		1861.		1862.		1863.		Average of Years 1860-63.	
	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Treated per Cent. of Strength.	Died per 1,000 of Strength.
Erysipelas	1	1	2	2	2	—	—	—	—	—
Furunculosis	—	—	4	—	6	—	3	—	—	—
Influenza	—	—	2	—	6	—	18	2	—	—
Dysentery	90	20	79	16	100	15	87	19	16.90	21.72
Diarrhoea	481	58	375	39	498	66	554	58		
Cholera	109	66	114	94	60	45	15	14	2.22	16.34
Rheumatismus	3	—	2	—	2	—	3	—	.07	—
Syphilis Secundaria	1	1	1	—	—	—	1	—	—	—
Gonorrhoea	—	—	3	—	—	—	1	—	—	—
Scorbutus	8	3	—	—	1	—	1	—	—	—
Aphthae	3	—	—	—	7	3	4	2	—	—
Porrigi	—	—	—	—	2	—	1	—	—	—
Scabies	—	—	1	—	5	—	4	—	—	—
Vermes	14	—	10	—	8	—	4	—	—	—
„ Tenia	—	—	7	—	10	—	9	—	—	—
„ Dracunculus	—	—	—	—	2	—	—	—	—	—
Anemia	—	—	—	—	—	—	61	—	—	—
Anasarca	2	1	—	—	1	—	2	—	—	—
Scrofula	7	4	1	—	5	1	12	1	—	—
Tabes Mesenterica	4	3	8	4	14	11	15	10	.59	2.84
Phthisis Pulmonalis	1	—	3	3	5	1	1	—		
Morbus Coxæ	2	—	1	—	—	—	—	—	—	—
Meningitis	—	—	1	—	—	6	1	—	—	—
Myelitis	1	—	—	—	—	—	—	—	—	—
Encephalitis	—	—	—	—	—	—	3	3	—	—
Hydrocephalus	18	13	3	2	—	5	6	5	2.02	14.40
Apoplexia	1	—	1	1	—	—	1	1		
Epilepsia	4	—	3	1	—	—	4	—	—	—
Convulsio	55	46	35	25	61	43	56	42	—	—
Paralysis	—	—	1	—	—	—	1	—	—	—
Chorea	—	—	—	—	2	—	1	—	—	—
Hysteria	1	—	2	—	—	—	1	—	—	—
Tetanus	—	—	—	—	—	—	3	3	.38	.30
Trismus	—	—	—	—	—	—	1	1		
Cephaloea	—	—	2	—	3	—	—	—	—	—
Otitis	5	—	6	—	8	—	10	—	—	—
Dysecoea	—	—	—	—	1	—	2	—	—	—
Palpitatio	—	—	1	—	—	—	1	—	—	—
Endocarditis	—	—	2	—	2	—	3	1	—	—
Epistaxis	—	—	—	—	3	—	—	—	—	—
Laryngitis	2	—	2	1	7	2	—	—	—	—
Bronchitis	61	3	83	7	108	16	98	7	2.95	3.43
Pleuritis	—	—	2	—	—	—	1	1		
Pneumonia	4	2	8	1	5	3	8	2	—	—
Asthma	—	—	3	1	—	—	—	—	—	—
Glossitis	—	—	1	1	—	—	—	—	—	—
Pharyngitis	4	1	—	—	1	—	—	—	—	—
Gastritis	—	—	—	—	1	—	1	—	—	—
Enteritis	3	—	—	—	—	—	3	3	—	—
Peritonitis	—	—	—	—	1	1	1	—	—	—
Obstipatio	3	—	2	—	2	—	2	—	—	—
Hernia	2	—	1	—	—	—	1	—	—	—
Dyspepsia	3	—	4	—	3	—	12	—	—	—
Colica	4	—	13	1	10	—	7	—	—	—
Hæmorrhoids	1	—	—	—	3	—	1	—	—	—
Splenitis	2	1	5	—	16	1	22	—	.34	.15
Hepatitis	11	2	7	—	5	—	12	2	.26	.30
Icterus	4	—	—	—	1	—	1	—	—	—
Ascites	—	—	—	—	—	—	4	—	—	—
Phymosis	—	—	1	—	—	—	1	—	—	—
Ischuria	1	—	—	—	4	—	2	—	—	—
Leucorrhoea	1	—	—	—	3	—	6	—	—	—
Synovitis	—	—	—	—	1	—	1	—	—	—
Contractura	—	—	—	—	—	—	2	—	—	—
Caries	—	—	1	1	1	—	—	—	—	—
Necrosis	—	—	—	—	—	—	1	—	—	—
Morbi Cutis	5	—	11	—	7	—	18	—	—	—
Phlegmon	50	—	26	—	34	—	35	—	—	—
Paronychia	—	—	—	—	2	—	2	—	—	—
Tumor	—	—	5	2	5	—	9	1	2.08	.30
Abscessus	—	—	1	—	—	—	—	—		
Ulcus	14	—	20	—	17	—	17	1	—	—
Dentition	39	11	86	16	138	25	163	28	3.22	5.97
Amenorrhoea	—	—	3	—	1	—	—	—	—	—
Hæmelip	—	—	—	—	—	—	2	—	—	—
Atrophy and Debility	56	22	61	18	95	16	80	31	2.18	6.49
Injury	32	2	33	1	39	1	45	4	1.11	.60
Not specified	16	—	1	—	—	—	1	—	—	—
Ratio for all Diseases not specially calculated	—	—	—	—	—	—	—	—	2.76	1.78
	2,532	327	2,778	283	3,196	310	3,010	291	85.93	90.37

Note.—The words and figures in *italics* were printed in red in the original.

NATIVE TROOPS, 1861.

COMPARATIVE STATEMENT of the Ratios of Sickness and Mortality among the Native Troops serving in the various PROVINCES of the BENGAL PRESIDENCY, during the Year 1861.

(Police Corps, and the Punjab and Central India Civil and Irregular Corps, are not included in this Statement.)

DISEASES.	LOWER BENGAL AND ASSAM.			BENARES, OUDHE, AND N.W. PROVINCES.			CENTRAL INDIA.			PUNJAB.			HILL STATIONS.			BENGAL PRESIDENCY.		
	Average Strength -			Average Strength -			Average Strength -			Average Strength -			Average Strength -			Average Strength -		
	Daily Sick per Cent. of Strength -	Admitted per Cent. of Strength -	Died per 1,000 of Strength -	Daily Sick per Cent. of Strength -	Admitted per Cent. of Strength -	Died per 1,000 of Strength -	Daily Sick per Cent. of Strength -	Admitted per Cent. of Strength -	Died per 1,000 of Strength -	Daily Sick per Cent. of Strength -	Admitted per Cent. of Strength -	Died per 1,000 of Strength -	Daily Sick per Cent. of Strength -	Admitted per Cent. of Strength -	Died per 1,000 of Strength -	Daily Sick per Cent. of Strength -	Admitted per Cent. of Strength -	Died per 1,000 of Strength -
	5,954	455	121.21	13,634	391	105.65	7,804	393	141.22	10,171	408	118.47	2,234	315	80.73	39,797	401	116.90
	Died per 1,000 of Strength : A. From Cholera 6.38 B. From all Causes 37.79			Died per 1,000 of Strength : A. From Cholera 25 B. From all Causes 5.22			Died per 1,000 of Strength : A. From Cholera 6.88 B. From all Causes 48.47			Died per 1,000 of Strength : A. From Cholera 3.12 B. From all Causes 12.12			Died per 1,000 of Strength : A. From Cholera 3.12 B. From all Causes 12.12			Died per 1,000 of Strength : A. From Cholera 4.09 B. From all Causes 16.79		
	Admitted per Cent. of Average Strength.	Died per 1,000 of Average Strength.		Admitted per Cent. of Average Strength.	Died per 1,000 of Average Strength.		Admitted per Cent. of Average Strength.	Died per 1,000 of Average Strength.		Admitted per Cent. of Average Strength.	Died per 1,000 of Average Strength.		Admitted per Cent. of Average Strength.	Died per 1,000 of Average Strength.		Admitted per Cent. of Average Strength.	Died per 1,000 of Average Strength.	
Cholera -	1.66	38.38	6.38	.91	37.10	3.38	.11	22.22	.25	1.34	51.47	6.88	.94	33.33	3.12	.98	41.90	4.09
Small-pox -	.55	9.10	.50	.07	22.22	.44	.14	27.27	.38	.25	34.62	.88	2.19	10.20	2.24	.32	17.20	.56
Fevers -	62.58	1.69	40.58	45.09	.70	3.15	89.50	.23	2.03	61.80	.46	2.85	25.42	1.06	2.68	59.56	.67	3.97
Dysentery -	7.71	5.23	4.03	7.09	2.07	1.47	4.96	2.07	1.02	5.66	2.60	1.47	2.55	3.51	.89	6.15	2.82	1.73
Diarrhea -	7.84	7.07	5.55	4.84	1.66	.81	1.91	-	-	4.12	2.62	1.08	5.50	1.64	.90	4.57	3.14	1.43
Hepatitis -	.09	-	-	.22	-	-	.17	-	-	.09	-	-	.22	-	-	.16	12.90	.23
Ophthalmia -	.87	-	-	1.84	-	-	2.03	-	-	2.21	-	-	4.75	-	-	1.99	-	-
Rheumatism -	4.49	-	-	5.47	-	-	3.78	-	-	4.41	-	-	5.33	-	-	4.62	-	-
Veneral Diseases -	4.65	-	-	6.27	-	-	9.02	-	-	5.16	-	-	7.52	-	-	6.36	-	-
Phthisis Pulmonalis -	.25	60.00	1.51	.07	44.44	.30	.04	66.66	.25	.09	66.66	.59	.22	20.00	.50	.10	51.22	.55
Apoplexy -	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	.04	50.00	.20
Delirium Tremens -	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Epilepsy -	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	.04	-	-
Respiratory Disease -	3.95	8.09	3.19	2.32	6.01	1.39	2.42	.53	.12	2.47	7.17	1.77	2.73	5.00	1.34	2.65	5.70	1.51
Abscess and Ulcer -	7.44	-	-	14.25	-	-	8.74	-	-	10.54	-	-	9.62	-	-	10.35	-	-
Wounds and Accidents -	3.86	-	-	6.86	-	-	7.28	-	-	10.26	-	-	6.04	-	-	7.39	-	.13
All other Causes -	15.27	-	6.05	10.35	-	2.42	11.12	-	1.45	10.07	-	2.95	7.70	-	.45	11.02	-	2.39
	121.21	-	37.79	105.65	-	43.06	141.22	-	5.22	118.47	-	48.47	80.73	-	12.12	116.90	-	16.79

* Died out of hospital, in other hospitals, or on leave at their homes, 140 men, or 3.52 per 1,000 of strength, making the total mortality of the year 20.31 per 1,000.

Note.—The words and figures in *italics* were printed in red in the original.

COMPARATIVE STATEMENT of the Ratios of SICKNESS and MORTALITY among the NATIVE TROOPS serving in the various Provinces of the Bengal Presidency during the Year 1862.

(Police corps, and the Punjab and Central India civil and irregular corps, are not included in this Statement.)

DISEASES.	LOWER BENGAL AND ASSAM.			BENARES, OUDE, AND N. W. PROVINCES.			CENTRAL INDIA.			PUNJAB.			HILL STATIONS.			BENGAL PRESIDENCY.		
	Admitted per cent. of Average Strength.	Died per cent. of Admissions.	Died per 1,000 of Average Strength.	Admitted per cent. of Average Strength.	Died per cent. of Admissions.	Died per 1,000 of Average Strength.	Admitted per cent. of Average Strength.	Died per cent. of Admissions.	Died per 1,000 of Average Strength.	Admitted per cent. of Average Strength.	Died per cent. of Admissions.	Died per 1,000 of Average Strength.	Admitted per cent. of Average Strength.	Died per cent. of Admissions.	Died per 1,000 of Average Strength.	Admitted per cent. of Average Strength.	Died per cent. of Admissions.	Died per 1,000 of Average Strength.
	Average Strength - 6,431	Daily Sick per cent. of Strength - 5.09	Admitted per cent. of Strength - 132.50	Average Strength - 12,292	Daily Sick per cent. of Strength - 4.13	Admitted per cent. of Strength - 119.34	Average Strength - 5,415	Daily Sick per cent. of Strength - 4.53	Admitted per cent. of Strength - 155.92	Average Strength - 9,026	Daily Sick per cent. of Strength - 4.92	Admitted per cent. of Strength - 176.69	Average Strength - 2,758	Daily Sick per cent. of Strength - 3.16	Admitted per cent. of Strength - 78.17	Average Strength - 35,922	Daily Sick per cent. of Strength - 4.48	Admitted per cent. of Strength - 138.45
	Died per 1,000 of Strength— A. From Cholera - 5.44 B. From all Causes - 27.83			Died per 1,000 of Strength— A. From Cholera - .57 B. From all Causes - 7.56			Died per 1,000 of Strength— A. From Cholera - 1.30 B. From all Causes - 8.68			Died per 1,000 of Strength— A. From Cholera - 3.99 B. From all Causes - 16.84			Died per 1,000 of Strength— A. From Cholera - 1.81 B. From all Causes - 11.24			Died per 1,000 of Strength— A. From Cholera - 2.51 B. From all Causes - 13.97*		
Cholera -	1.09	50.00	5.44	.21	27.00	.57	.39	33.33	1.30	.61	65.45	3.99	.25	71.43	1.81	.50	50.28	2.51
Small-pox -	.15	30.00	.46	.02	-	-	.04	-	-	.01	-	-	.33	-	-	.07	12.50	.08
Fevers -	68.90	1.20	8.24	53.69	.36	1.95	99.72	.26	2.59	114.39	.48	5.43	26.50	1.09	2.90	76.52	.54	4.72
Dysentery -	13.09	4.16	5.44	5.54	2.20	1.22	4.97	1.49	.74	6.39	1.56	1.00	2.54	1.43	.36	6.79	2.62	4.78
Diarrhoea -	5.96	2.88	1.71	3.58	.45	.16	2.95	1.25	.37	6.15	1.44	.89	2.86	1.27	.36	4.50	1.48	.67
Hepatitis -	.08	-	.31	.17	-	.08	.26	-	.48	.13	-	.22	.65	-	.36	.19	10.00	.19
Ophthalmia -	1.07	-	-	2.28	-	-	2.18	-	-	2.95	-	-	3.92	-	-	2.34	-	-
Rheumatism -	5.43	-	-	6.03	-	-	4.26	-	-	4.38	-	-	4.97	-	-	5.16	-	-
Veneral Diseases -	4.50	-	-	6.21	-	-	9.22	-	-	4.58	-	-	6.50	-	-	5.97	-	-
Phthisis Pulmonalis -	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	.08	60.00	.50
Apoplexy -	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	.06	63.16	.33
Delirium Tremens -	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Epilepsy -	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	.06	-	-
Respiratory Diseases -	2.92	4.26	1.25	2.67	3.96	1.06	1.46	10.13	1.48	2.45	12.22	2.99	2.76	3.94	1.09	2.48	6.61	4.64
Abscess and Ulcer -	10.98	-	-	17.85	-	-	13.52	-	-	10.91	-	-	7.90	-	-	13.46	-	-
Wounds and Accidents -	7.15	-	.78	9.59	-	.46	9.09	-	.48	12.54	-	.83	10.80	-	-	9.90	-	.31
All other Diseases -	11.18	-	4.20	11.50	-	2.36	7.86	-	1.84	11.20	-	1.99	8.19	-	4.36	10.37	-	1.84
	132.50	-	27.83	119.34	-	7.56	155.92	-	8.68	176.69	-	16.84	78.17	-	11.24	138.45	-	13.97

* Died out of Hospital, in other Hospitals, or on Leave at their Homes, 113 men, or 3.15 per 1,000 of Strength, making the Total Mortality of the Year 17.12 per 1,000.

Note.—The words and figures printed in italics were printed in red in the original.

NATIVE TROOPS, 1863.

COMPARATIVE STATEMENT of the Ratios of SICKNESS and MORTALITY among the NATIVE TROOPS serving in the various Provinces of the Bengal Presidency during the Year 1863.

(Police corps, and the Punjab and Central India civil and irregular corps, are not included in this Statement.)

DISEASES.	LOWER BENGAL AND ASSAM.			BENARES, OUDE, AND N.W. PROVINCES.			CENTRAL INDIA.			PUNJAB.			HILL STATIONS.			BENGAL PRESIDENCY.		
	Average Strength per cent.	Daily Sick per cent. of Strength	Admitted per cent. of Strength	Average Strength per cent.	Daily Sick per cent. of Strength	Admitted per cent. of Strength	Average Strength per cent.	Daily Sick per cent. of Strength	Admitted per cent. of Strength	Average Strength per cent.	Daily Sick per cent. of Strength	Admitted per cent. of Strength	Average Strength per cent.	Daily Sick per cent. of Strength	Admitted per cent. of Strength	Average Strength per cent.	Daily Sick per cent. of Strength	Admitted per cent. of Strength
	6,583	4.86	145.05	12,899	3.90	112.15	5,028	4.93	125.89	10,307	5.67	216.66	2,642	2.92	99.58	37,459	4.62	147.65
	Died per 1,000 of Strength—			Died per 1,000 of Strength—			Died per 1,000 of Strength—			Died per 1,000 of Strength—			Died per 1,000 of Strength—			Died per 1,000 of Strength—		
	A. From Cholera - 4.25			A. From Cholera - 2.09			A. From Cholera - .40			A. From Cholera - 47.17			A. From Cholera - —			A. From Cholera - 1.44		
	B. From all Causes - 23.24			B. From all Causes - 11.55			B. From all Causes - 9.35			B. From all Causes - 47.17			B. From all Causes - 8.33			B. From all Causes - 14.63		
	Admitted per cent. of Average Strength.	Died per 1,000 of Average Strength.	Died per cent. of Admissions.	Admitted per cent. of Average Strength.	Died per 1,000 of Average Strength.	Died per cent. of Admissions.	Admitted per cent. of Average Strength.	Died per 1,000 of Average Strength.	Died per cent. of Admissions.	Admitted per cent. of Average Strength.	Died per 1,000 of Average Strength.	Died per cent. of Admissions.	Admitted per cent. of Average Strength.	Died per 1,000 of Average Strength.	Died per cent. of Admissions.	Admitted per cent. of Average Strength.	Died per 1,000 of Average Strength.	Died per cent. of Admissions.
Cholera -	.68	62.22	33.33	.38	55.10	—	.06	66.67	—	.02	—	—	.04	—	—	.26	57.00	4.52
Small-pox -	.45	33.33	—	.04	—	—	.02	—	—	.03	—	—	.42	—	—	.14	19.61	.27
Fevers -	76.52	.87	—	53.71	.55	—	65.39	.61	—	124.64	.40	—	32.89	.58	—	77.34	.55	4.25
Dysentery -	11.29	3.63	—	7.22	1.93	—	3.48	2.29	.80	12.20	1.98	—	3.22	—	—	8.52	2.32	4.97
Diarrhoea -	8.11	1.68	—	3.45	2.02	—	2.37	3.36	.80	10.07	1.25	—	4.09	.92	—	5.99	1.60	.96
Hepatitis -	.15	—	—	.14	—	—	.20	4.86	—	.19	—	—	—	—	—	.19	2.78	.05
Ophthalmia -	1.31	—	—	2.25	—	—	1.99	—	—	2.85	—	—	5.26	—	—	2.43	—	—
Rheumatism -	4.12	—	—	4.06	—	—	5.67	—	—	5.66	—	—	5.08	—	—	4.80	—	—
Veneral Diseases -	4.01	—	—	4.79	—	—	7.08	—	—	4.54	—	—	5.68	—	—	4.95	—	—
Phthisis Pulmonalis -	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	.10	25.00	.27
Apoplexy -	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	.05	60.00	.32
Delirium Tremens -	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Epilepsy -	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	.06	—	—
Respiratory Diseases -	3.31	2.29	—	2.06	5.26	—	2.87	—	—	3.76	6.54	—	3.26	3.49	—	2.92	4.93	1.44
Abscess and Ulcer -	9.61	—	—	13.40	—	—	14.96	—	—	12.88	—	—	8.78	—	—	12.47	—	—
Wounds and Accidents -	8.08	—	—	9.33	—	—	10.44	—	—	17.38	—	—	18.25	—	—	12.09	—	1.09
All other Diseases -	17.41	—	—	11.32	—	—	11.36	—	—	22.44	—	—	12.61	—	—	15.34	—	2.49
	145.05	—	—	112.15	—	—	125.89	—	—	216.66	—	—	99.58	—	—	147.65	—	44.63

* Killed in action 82; died out of Hospital, in other Hospitals, or on Leave at their Homes, 109. Total Mortality of the Year, 19,775 per 1,000.

Note.—The words and figures printed in italics were printed in red in the original.

COMPARATIVE STATEMENT of the Ratios of Sickness and Mortality among the GAOL POPULATION in the various Provinces of the Bengal Presidency, for the Year 1859.

DISEASES.	BENGAL PROPER AND ASSAM. (Excluding the Behar Provinces.)				BEHAR PROVINCES, BENARES AND OUDÉ, EASTERN DOAB AND BUNDELCUND.				NAGPORE AND CENTRAL INDIA.				ROHILCUND, MEERUT, AND AGRA.				PUNJAB.				BENGAL PRESIDENCY.			
	Admitted per cent. of Average Strength.	Died per cent. of Ad- missions.	Died per 1,000 of Average Strength.	Admitted per cent. of Average Strength.	Died per cent. of Ad- missions.	Died per 1,000 of Average Strength.	Admitted per cent. of Average Strength.	Died per cent. of Ad- missions.	Died per 1,000 of Average Strength.	Admitted per cent. of Average Strength.	Died per cent. of Ad- missions.	Died per 1,000 of Average Strength.	Admitted per cent. of Average Strength.	Died per cent. of Ad- missions.	Died per 1,000 of Average Strength.	Admitted per cent. of Average Strength.	Died per cent. of Ad- missions.	Died per 1,000 of Average Strength.	Admitted per cent. of Average Strength.	Died per cent. of Ad- missions.	Died per 1,000 of Average Strength.	Admitted per cent. of Average Strength.	Died per cent. of Ad- missions.	Died per 1,000 of Average Strength.
Cholera -	4.06	46.71	48.95	2.45	51.18	42.55	1.10	20.00	2.24	20.00	2.24	20.00	2.24	20.00	2.24	20.00	2.24	20.00	2.24	20.00	2.24	20.00	2.24	20.00
Small-pox -	1.18	33.33	39	48.93	5.56	23	50.68	8.46	47.55	51.36	2.73	4.03	51.36	2.73	4.03	51.36	2.73	4.03	51.36	2.73	4.03	51.36	2.73	4.03
Fevers -	46.13	1.03	4.75	33.12	2.90	4.48	21.72	14.54	31.58	24.64	16.41	40.44	24.64	16.41	40.44	24.64	16.41	40.44	24.64	16.41	40.44	24.64	16.41	40.44
Dysentery and Diarrhoea -	36.60	13.91	50.94	16	19.00	62.87	0.6	66.66	4.2	66.66	4.2	66.66	4.2	66.66	4.2	66.66	4.2	66.66	4.2	66.66	4.2	66.66	4.2	66.66
Hepatitis -	15	18.18	27	34	13.80	47	41	10.00	4.2	41	10.00	4.2	41	10.00	4.2	41	10.00	4.2	41	10.00	4.2	41	10.00	4.2
Spleen Disease -	3.38	2.21	49	2.10	-	-	1.92	-	-	1.92	-	-	1.92	-	-	1.92	-	-	1.92	-	-	1.92	-	-
Ophthalmia -	5.62	-	-	2.59	-	-	5.64	-	-	5.64	-	-	5.64	-	-	5.64	-	-	5.64	-	-	5.64	-	-
Rheumatism -	68	8.61	27	79	19.12	4.51	4.13	5.00	2.06	4.13	5.00	2.06	4.13	5.00	2.06	4.13	5.00	2.06	4.13	5.00	2.06	4.13	5.00	2.06
Scurvy -	1.38	29.38	4.04	24	57.14	4.39	18	100.00	4.86	18	100.00	4.86	18	100.00	4.86	18	100.00	4.86	18	100.00	4.86	18	100.00	4.86
Dropsy -	2.85	20.78	5.92	1.48	33.86	5.35	1.20	75.86	9.08	1.20	75.86	9.08	1.20	75.86	9.08	1.20	75.86	9.08	1.20	75.86	9.08	1.20	75.86	9.08
Atrophy and Anemia -	89	70.80	6.31	39	61.77	2.44	10	80.00	8.2	10	80.00	8.2	10	80.00	8.2	10	80.00	8.2	10	80.00	8.2	10	80.00	8.2
Phthisis Pulmonalis -	11	94.12	4.04	15	76.92	4.16	0.4	50.00	2.1	0.4	50.00	2.1	0.4	50.00	2.1	0.4	50.00	2.1	0.4	50.00	2.1	0.4	50.00	2.1
Apoplexy -	8.64	7.23	6.25	3.66	14.92	5.45	4.13	16.50	6.81	4.13	16.50	6.81	4.13	16.50	6.81	4.13	16.50	6.81	4.13	16.50	6.81	4.13	16.50	6.81
Respiratory Diseases -	10.87	-	7.8	13.09	-	4.51	19.86	-	8.72	19.86	-	8.72	19.86	-	8.72	19.86	-	8.72	19.86	-	8.72	19.86	-	8.72
Abscess and Ulcer -	4.35	-	5.9	4.92	-	4.39	4.67	-	2.89	4.67	-	2.89	4.67	-	2.89	4.67	-	2.89	4.67	-	2.89	4.67	-	2.89
Injury -	27.52	-	4.29	16.54	1.89	4.54	20.73	1.99	4.72	20.73	1.99	4.72	20.73	1.99	4.72	20.73	1.99	4.72	20.73	1.99	4.72	20.73	1.99	4.72
All other Causes -	154.30	-	405.45	131.37	-	445.51	135.57	-	81.75	135.57	-	81.75	135.57	-	81.75	135.57	-	81.75	135.57	-	81.75	135.57	-	81.75

Note.—The words and figures printed in *italics* were printed in red in the original.

GAOLS OF THE BENGAL PRESIDENCY, 1860.

COMPARATIVE STATEMENT of the Ratios of SICKNESS and MORTALITY among the GAOL POPULATION in the various Provinces of the Bengal Presidency, for the Year 1860.

DISEASES.	BENGAL PROVINCES, BENARES AND OUDH, EASTERN DOAB AND BUNDELKUND.				NAGPORE AND CENTRAL INDIA.				ROHILKUND, MEERUT, AND AGRA.				PUNJAB.				BENGAL PRESIDENCY.			
	Average Strength	Daily Sick per cent. of Strength	Admitted per cent. of Strength	Died per 1,000 of Strength— A. From Cholera B. From Gaol Fever C. From all Causes	Average Strength	Daily Sick per cent. of Strength	Admitted per cent. of Strength	Died per 1,000 of Strength— A. From Cholera B. From Gaol Fever C. From all Causes	Average Strength	Daily Sick per cent. of Strength	Admitted per cent. of Strength	Died per 1,000 of Strength— A. From Cholera B. From Gaol Fever C. From all Causes	Average Strength	Daily Sick per cent. of Strength	Admitted per cent. of Strength	Died per 1,000 of Strength— A. From Cholera B. From Gaol Fever C. From all Causes	Average Strength	Daily Sick per cent. of Strength	Admitted per cent. of Strength	Died per 1,000 of Strength— A. From Cholera B. From Gaol Fever C. From all Causes
Cholera	14,335	6.14	165.92	38.29	9,511	6.96	146.01	20.82	4,981	7.995	5.85	186.87	9,826	3.75	102.09	21.66	46,348	5.74	149.18	21.66
Small-pox	23.88	1.01	47	4.42	36.06	6.29	57.33	36.06	4.04	39	66.93	4.45	4.88	4.88	29.77	4.88	22.42	4.88	4.88	4.88
Fever	53.71	41.25	21	5.44	55.93	16.45	33.33	55.93	20.08	8.67	15.86	4.04	5.30	5.30	15.39	5.30	13.83	5.30	13.83	5.30
Dysentery and Diarrhoea	41.25	14.76	32.26	7.0	10	13.04	4.8	10	2.0	6.66	11.11	2.6	1.3	1.3	6.06	2.0	31.43	1.3	6.06	2.0
Hepatitis	80	4.35	3.57	3.5	2.33	2.33	2.33	2.33	2.33	2.72	2.72	2.72	2.72	2.72	2.72	2.72	3.06	2.72	3.06	2.72
Spleen Disease	4.79	—	—	—	2.40	—	—	—	—	2.40	—	—	—	—	—	—	—	—	—	—
Ophthalmia	90	6.20	4.79	5.6	7.4	15.56	4.7	7.4	8.0	3.75	3.75	3.75	3.75	3.75	3.75	3.75	3.75	3.75	3.75	3.75
Rheumatism	1.11	43.75	4.58	4.58	4.05	38.46	2.7	4.05	5.55	2.1	37.50	7.3	—	—	—	—	6.12	—	—	—
Scurvy	2.58	20.27	5.23	5.23	6.10	23.29	2.62	6.10	4.82	7.27	23.93	4.41	—	—	—	—	4.5	—	—	—
Dropsy	85	71.31	6.07	6.07	2.00	82.61	2.4	2.00	6.0	3.9	63.33	2.47	9.00	9.00	9.00	9.00	11.38	9.00	11.38	9.00
Atrophy and Anæmia	10	71.43	7.0	7.0	1.68	76.19	2.2	1.68	4.0	1.0	50.00	5.2	40.00	40.00	40.00	40.00	72.48	40.00	72.48	40.00
Phthisis Pulmonalis	6.39	8.84	5.65	5.65	5.15	15.46	3.33	5.15	2.24	5.17	16.83	8.71	3.55	3.55	3.55	3.55	68.00	3.55	68.00	3.55
Apoplexy	11.21	—	—	—	3.89	—	17.46	3.89	4.81	13.59	—	7.8	16.19	16.19	16.19	16.19	10.70	16.19	10.70	16.19
Respiratory Diseases	4.07	—	—	—	9.5	—	4.09	9.5	4.61	8.71	—	4.04	3.82	3.82	3.82	3.82	15.32	3.82	15.32	3.82
Abscess and Ulcer	25.46	—	—	—	5.05	—	15.94	5.05	4.41	31.69	—	5.72	17.40	17.40	17.40	17.40	4.83	17.40	4.83	17.40
Injury	165.92	—	—	—	146.01	—	146.01	146.01	142.82	186.87	—	470.50	102.09	102.09	102.09	102.09	1.44	102.09	1.44	102.09
All other Causes	136.10	—	—	—	140.15	—	140.15	140.15	65.04	186.87	—	470.50	102.09	102.09	102.09	102.09	4.79	102.09	4.79	102.09

* Gaol Fever at Allahabad and Lucknow.

† Gaol Fever at Meerut and Agra.

Note.—The words and figures printed in italics were printed in red in the original.

GAOLS OF THE BENGAL PRESIDENCY, 1861.

COMPARATIVE STATEMENT of the Ratios of Sickness and Mortality among the GAOL POPULATION in the various Provinces of the Bengal Presidency, for the Year 1861.

DISEASES.	BENGAL PROVINCES, BENARAS AND OUDE, EASTERN DOAB AND BEHAR PROVINCES).				NAGPORE AND CENTRAL INDIA.				ROHILCUND, MEERUT, AND AGRA.				PUNJAB.				BENGAL PRESIDENCY.			
	Average Strength	Daily Sick per cent. of Strength	Admitted per cent. of Strength	Died per 1,000 of Strength— A. From Cholera B. From Gaol Fever C. From all Causes	Average Strength	Daily Sick per cent. of Strength	Admitted per cent. of Strength	Died per 1,000 of Strength— A. From Cholera B. From Gaol Fever C. From all Causes	Average Strength	Daily Sick per cent. of Strength	Admitted per cent. of Strength	Died per 1,000 of Strength— A. From Cholera B. From Gaol Fever C. From all Causes	Average Strength	Daily Sick per cent. of Strength	Admitted per cent. of Strength	Died per 1,000 of Strength— A. From Cholera B. From Gaol Fever C. From all Causes	Average Strength	Daily Sick per cent. of Strength	Admitted per cent. of Strength	Died per 1,000 of Strength— A. From Cholera B. From Gaol Fever C. From all Causes
Cholera	340	38.82	43.21		55	42.86	2.36		9.22	44.33	40.85		92	4.43	3.65	41.63	10,835	50.915	3.65	41.63
Small-pox	10	14.29	14		0.4	—	—		0.3	—	—		0.2	—	10	6.00	—	—	—	—
Fever	56.24	91	5.10		41.76	1.32	5.50		61.20	9.90	60.64		60.81	34.06	53.36	4.19	4.68	4.83	4.19	—
Dysentery & Diarrhoea	34.63	12.75	44.77		12.79	11.21	4.35		23.12	23.18	53.57		20.30	26.76	25.52	15.08	15.08	38.47	15.08	—
Hepatitis	17	—	65		—	—	—		14	—	44		0.7	—	12	23.44	30	30	23.44	—
Spleen Disease	85	5.93	50		19	—	—		23	—	—		80	37	52	7.20	37	37	7.20	—
Ophthalmia	2.24	—	—		1.55	—	—		1.54	—	—		2.77	—	2.00	—	37	37	2.00	—
Rheumatism	4.47	—	—		2.04	—	—		1.31	—	—		1.84	—	2.61	—	41	41	2.61	—
Scurvy	81	—	43		2.32	—	2.55		0.5	—	40		1.39	—	82	8.13	67	67	8.13	—
Dropsy	1.11	31.17	3.45		38	62.50	98		28	25.93	73		0.9	66.66	45	35.52	4.59	4.59	35.52	—
Atrophy and Anemia	1.50	23.08	3.45		1.55	21.87	4.88		2.60	38.24	9.93		1.46	19.62	1.62	25.70	4.16	4.16	25.70	—
Phthisis Pulmonalis	60	88.10	5.31		10	60.00	59		32	61.30	4.96		0.5	20.00	27	75.73	2.02	2.02	75.73	—
Apoplexy	0.06	77.78	5.0		14	50.00	20		14	30.00	44		0.6	100.00	0.9	68.09	63	63	68.09	—
Respiratory Diseases	4.81	10.31	4.96		2.72	9.68	2.36		3.55	13.12	4.66		2.99	15.43	3.47	12.05	4.18	4.18	12.05	—
Abscess and Ulcer	8.88	—	—		10.93	—	—		12.45	—	—		13.73	—	11.79	—	4.16	4.16	—	—
Injury	3.91	—	—		4.34	—	—		6.99	—	—		4.27	—	4.73	—	77	77	4.73	—
All other Diseases	20.48	—	5.62		18.41	—	3.73		16.73	—	40.45		15.79	—	20.30	—	3.97	3.97	20.30	—
	150.26	—	87.69		109.80	—	24.00		139.90	—	483.68		127.36	—	131.42	—	96.65	96.65	131.42	—

† Gaol Fever at Thanesur, Umballa, Loodianah, and Jullundur.

Note.—The words and figures printed in italics were printed in red in the original.

* Gaol Fever at Allypore and Meerut.

GAOLS OF THE BENGAL PRESIDENCY, 1862.

COMPARATIVE STATEMENT of the Ratios of SICKNESS and MORTALITY among the GAOL POPULATION in the various PROVINCES of the Bengal Presidency, for the Year 1862.

DISEASES.	BENGAL PROVINCES, BENARES AND OUDE, EASTERN DOAB AND BUNDELKUND.				NAGPORE AND CENTRAL INDIA.				ROHILKUND, MEERUT, AND AGRA.				PUNJAB.				BENGAL PRESIDENCY.			
	Average Strength	Daily Sick per cent. of Strength	Admitted per cent. of Strength	Died per 1,000 of Strength— A. From Cholera — B. From Gaol Fever — C. From all Causes —	Average Strength	Daily Sick per cent. of Strength	Admitted per cent. of Strength	Died per 1,000 of Strength— A. From Cholera — B. From Gaol Fever — C. From all Causes —	Average Strength	Daily Sick per cent. of Strength	Admitted per cent. of Strength	Died per 1,000 of Strength— A. From Cholera — B. From Gaol Fever — C. From all Causes —	Average Strength	Daily Sick per cent. of Strength	Admitted per cent. of Strength	Died per 1,000 of Strength— A. From Cholera — B. From Gaol Fever — C. From all Causes —	Average Strength	Daily Sick per cent. of Strength	Admitted per cent. of Strength	Died per 1,000 of Strength— A. From Cholera — B. From Gaol Fever — C. From all Causes —
Cholera -	14,692	-	-	-	5,316	-	-	-	8,534	-	-	-	10,854	-	-	-	52,871	-	-	-
Small-pox -	578	-	-	-	495	-	-	-	472	-	-	-	395	-	-	-	466	-	-	-
Fever -	16342	-	-	-	14103	-	-	-	15145	-	-	-	11706	-	-	-	13461	-	-	-
Dysentery & Diarrhoea -	994	-	-	-	470	-	-	-	499	-	-	-	808	-	-	-	532	-	-	-
Hepatitis -	994	-	-	-	470	-	-	-	499	-	-	-	808	-	-	-	532	-	-	-
Spleen Disease -	994	-	-	-	470	-	-	-	499	-	-	-	808	-	-	-	532	-	-	-
Ophthalmia -	994	-	-	-	470	-	-	-	499	-	-	-	808	-	-	-	532	-	-	-
Rheumatism -	994	-	-	-	470	-	-	-	499	-	-	-	808	-	-	-	532	-	-	-
Scurvy -	994	-	-	-	470	-	-	-	499	-	-	-	808	-	-	-	532	-	-	-
Dropsy -	994	-	-	-	470	-	-	-	499	-	-	-	808	-	-	-	532	-	-	-
Atrophy and Anemia -	994	-	-	-	470	-	-	-	499	-	-	-	808	-	-	-	532	-	-	-
Phthisis Pulmonalis -	994	-	-	-	470	-	-	-	499	-	-	-	808	-	-	-	532	-	-	-
Apoplexy -	994	-	-	-	470	-	-	-	499	-	-	-	808	-	-	-	532	-	-	-
Respiratory Diseases -	994	-	-	-	470	-	-	-	499	-	-	-	808	-	-	-	532	-	-	-
Abscess and Ulcer -	994	-	-	-	470	-	-	-	499	-	-	-	808	-	-	-	532	-	-	-
Injury -	994	-	-	-	470	-	-	-	499	-	-	-	808	-	-	-	532	-	-	-
All other Diseases -	994	-	-	-	470	-	-	-	499	-	-	-	808	-	-	-	532	-	-	-
	16342	-	-	-	14103	-	-	-	15145	-	-	-	11706	-	-	-	13461	-	-	-
	7861	-	-	-	3969	-	-	-	9702	-	-	-	5969	-	-	-	6675	-	-	-

* Gaol Fever at Agra, Meerut, Allyghur, Budaon, and Bareilly.

† Gaol Fever at Umballa, Loodianah, and Jullundur.
Note.—The words and figures printed in *italics* were printed in red in the original.

COMPARATIVE STATEMENT of the Ratios of SICKNESS and MORTALITY among the GAOL POPULATION in the various Provinces of the Bengal Presidency, for the Year 1863.

DISEASES.	BENGAL PROVINCES, BENARES AND OUDE, EASTERN DOAB AND BEHAR PROVINCES).				NAGPORE AND CENTRAL INDIA.				ROHILCUND, MEERUT, AND AGRA.				PUNJAB.				BENGAL PRESIDENCY.			
	Average Strength	Daily Sick per cent. of Strength	Admitted per cent. of Strength	Died per 1,000 of Strength— A. From Cholera — B. From Gaol Fever — C. From all Causes —	Average Strength	Daily Sick per cent. of Strength	Admitted per cent. of Strength	Died per 1,000 of Strength— A. From Cholera — B. From Gaol Fever — C. From all Causes —	Average Strength	Daily Sick per cent. of Strength	Admitted per cent. of Strength	Died per 1,000 of Strength— A. From Cholera — B. From Gaol Fever — C. From all Causes —	Average Strength	Daily Sick per cent. of Strength	Admitted per cent. of Strength	Died per 1,000 of Strength— A. From Cholera — B. From Gaol Fever — C. From all Causes —	Average Strength	Daily Sick per cent. of Strength	Admitted per cent. of Strength	Died per 1,000 of Strength— A. From Cholera — B. From Gaol Fever — C. From all Causes —
Cholera	532	37.90	20.75	23.94	564	42.44	23.94	23.94	10.03	40.00	5.72	5.72	—	—	3.58	40.10	44.33	—	—	—
Small-pox	15	4.35	0.6	.13	25	5.40	.13	.13	.40	.01	.40	.01	—	—	.13	7.58	.10	—	—	—
Fever	6350	71	4.51	5.46	3591	132	5.46	5.46	4.07	6.73	46.13	46.13	57.61	5.71	55.75	3.12	47.40	—	—	—
Dysentery & Diarrhoea	4180	11.27	4.73	50.46	3331	15.15	50.46	50.46	34.37	13.76	48.28	48.28	15.03	10.01	28.22	12.94	36.53	—	—	—
Hepatitis	25	—	.33	—	03	—	—	—	—	—	—	—	.17	12.50	.11	11.86	.13	—	—	—
Spleen Disease	128	6.22	.80	.28	28	9.76	.28	.28	—	.48	—	—	.55	3.77	.65	5.26	.34	—	—	—
Ophthalmia	171	—	—	—	283	—	—	—	—	1.96	—	—	2.62	—	2.20	—	—	—	—	—
Rheumatism	428	—	—	—	201	—	—	—	—	1.84	—	—	1.63	—	2.74	—	—	—	—	—
Scurvy	50	—	—	.07	18	3.85	.07	.07	—	.14	—	—	1.42	4.37	.52	—	.32	—	—	—
Dropsy	150	28.63	4.31	.48	09	53.85	.48	.48	.80	.09	28.57	28.57	.14	46.15	.51	19.10	1.60	—	—	—
Atrophy and Anemia	132	17.08	2.25	4.77	127	37.64	4.77	4.77	4.81	.82	34.85	34.85	3.14	17.55	.62	15.10	3.65	—	—	—
Phthisis Pulmonalis	62	68.82	4.24	.89	23	39.24	.89	.89	4.04	.28	63.64	63.64	.15	50.00	.73	65.27	2.08	—	—	—
Apoplexy	05	50.00	.27	.34	04	83.33	.34	.34	.81	.05	75.00	75.00	.08	100.00	.83	72.41	.40	—	—	—
Respiratory Diseases	488	8.02	3.91	4.23	314	13.45	4.23	4.23	3.42	2.59	9.13	9.13	2.54	13.52	3.45	10.50	3.63	—	—	—
Abscess and Ulcer	1151	—	—	1.16	1028	—	—	—	—	9.21	—	—	11.09	—	11.69	—	.82	—	—	—
Injury	357	—	—	.48	324	—	—	—	—	5.56	—	—	2.96	—	3.63	—	.53	—	—	—
All other Diseases	2823	—	4.77	5.04	1867	—	—	—	6.63	22.47	—	—	13.52	—	21.81	—	3.84	—	—	—
	17047	—	92.73	97.73	11740	—	—	—	73.37	129.28	—	—	112.65	—	136.88	—	85.84	—	—	—

* Gaol Fever at Raipore.

† Gaol Fever at Agra, Muttra, Allypore, Bareilly, Moradabad, and Delhi.

‡ Gaol Fever at Lahore and Mooltan.

Note.—The words and figures printed in italics were printed in red in the original.

EUROPEAN AND NATIVE ARMIES, 1860-63.

TABLE showing in detail the CAUSES of ADMISSIONS into HOSPITAL, and of DEATHS in HOSPITAL, for the EUROPEAN and NATIVE ARMIES of the Bengal Presidency, since the introduction of the System of Statistical Nomenclature now in use.

The Results shown in the case of the European Army should not be critically compared with those contained in the Tables which follow; the details here given represent, in summary, the number and causes of Admissions and Deaths shown in the Annual Returns furnished by Regiments, and these, in some years, it has been found impossible to obtain in a state of completeness.

DISEASES.	EUROPEAN ARMY.								NATIVE ARMY.							
	1860.		1861.		1862.		1863.		1861.		1862.		1863.			
	Av. Strgh. 48,318 Daily Sick 3,770 Admiss. 96,130 Deaths - 1,606		Av. Strgh. 42,977 Daily Sick 3,128 Admiss. 83,406 Deaths - 1,796		Av. Strgh. 43,541 Daily Sick 3,013 Admiss. 81,610 Deaths - 1,070		Av. Strgh. 41,471 Daily Sick 2,765 Admiss. 74,822 Deaths - 786		Av. Strgh. 39,797 Daily Sick 1,595 Admiss. 46,520 Deaths - 668		Av. Strgh. 35,922 Daily Sick 1,610 Admiss. 49,737 Deaths - 502		Av. Strgh. 37,459 Daily Sick 1,733 Admiss. 55,370 Deaths - 548			
	Admit- ted.	Died.	Admit- ted.	Died.	Admit- ted.	Died.	Admit- ted.	Died.	Admit- ted.	Died.	Admit- ted.	Died.	Admit- ted.	Died.	Admit- ted.	Died.
Variola - - -	150	23	213	34	15	2	44	10	128	22	24	3	51	10		
Varicella - - -	20	-	29	-	5	-	2	-	26	-	17	-	10	-		
Morbilli - - -	21	-	13	-	3	-	5	-	4	-	7	-	13	-		
Scarlatina - - -	1	1	2	2	-	-	1	-	-	-	-	-	1	-		
Consistitis - - -	883	1	761	2	630	1	594	-	73	-	56	-	63	-		
Parotitis - - -	10	-	17	-	18	-	20	-	40	-	66	-	80	-		
Fever, Intermittent - - -	17,764	30	18,486	37	24,446	40	23,762	56	22,909	85	27,059	105	28,236	107		
" Remittent - - -	4,939	108	3,207	45	2,423	50	2,205	37	665	69	377	35	691	47		
" Continued - - -	11,173	87	8,142	92	6,848	60	3,891	47	130	4	50	8	42	5		
Ophthalmia - - -	3,707	-	2,696	-	2,421	-	1,973	-	792	-	841	-	909	-		
Orysipelas - - -	87	4	83	3	65	2	66	2	19	5	25	1	17	4		
Erythema - - -	13	-	9	-	9	-	10	-	5	-	6	-	6	-		
Erysipela - - -	-	-	-	-	-	1	1	1	1	1	-	-	-	-		
Erysipela - - -	-	-	-	-	-	-	1	-	2	1	1	-	19	3		
Erysipela - - -	1	-	-	-	-	-	1	-	2	-	1	-	8	-		
Erysipela - - -	5	1	8	-	10	1	9	-	8	-	8	-	8	-		
Erysipela - - -	193	-	407	-	476	-	452	-	209	-	114	-	216	1		
Erysipela - - -	44	-	196	-	262	-	300	-	84	-	93	-	86	-		
Erysipela - - -	3,497	216	2,444	157	1,930	93	1,907	107	2,446	69	2,439	64	3,192	74		
Erysipela - - -	6,499	47	6,366	64	4,977	42	3,895	31	1,817	57	1,619	24	2,250	36		
Erysipela - - -	951	497	1,557	957	672	410	251	163	389	163	179	90	100	57		
Erysipela - - -	3,534	5	3,204	2	3,127	3	3,223	4	1,839	5	1,853	5	1,798	3		
Erysipela - - -	5,734	-	6,037	1	5,070	1	4,069	-	1,131	2	901	-	806	3		
Erysipela - - -	1,231	8	1,181	11	1,132	5	1,226	7	221	1	203	2	198	1		
Erysipela - - -	18	-	51	-	39	-	30	-	-	-	-	-	-	-		
Erysipela - - -	5,127	-	5,025	-	4,423	-	3,902	-	456	-	415	-	337	-		
Erysipela - - -	2,336	1	1,991	1	2,058	-	1,849	1	463	-	422	2	357	-		
Erysipela - - -	70	-	62	-	54	-	50	-	34	-	17	-	14	-		
Erysipela - - -	560	-	588	1	363	-	315	-	204	-	185	-	140	-		
Erysipela - - -	156	-	74	-	71	-	60	-	-	-	-	-	1	-		
Erysipela - - -	44	-	21	-	22	-	8	-	4	-	1	-	3	-		
Erysipela - - -	4	4	2	2	3	3	2	2	1	1	-	-	-	-		
Erysipela - - -	126	1	35	-	51	-	39	1	39	1	41	-	62	-		
Erysipela - - -	361	-	426	2	378	1	391	3	7	-	7	-	10	2		
Erysipela - - -	-	-	-	-	-	-	-	-	5	-	15	-	12	-		
Erysipela - - -	4	-	5	-	3	-	1	-	11	-	15	-	6	-		
Erysipela - - -	13	-	7	-	9	-	15	-	-	-	-	-	-	-		
Erysipela - - -	25	-	35	-	50	-	62	-	362	-	342	-	601	-		
Erysipela - - -	134	-	98	-	41	-	50	-	5	-	7	-	1	-		
Erysipela - - -	84	-	129	-	200	-	219	-	1	-	1	-	6	-		
Erysipela - - -	46	-	8	-	4	-	-	-	17	-	37	-	89	-		
Erysipela - - -	-	-	-	-	1	-	8	-	-	-	-	-	-	-		
Erysipela - - -	1	-	4	2	2	1	2	1	2	-	-	-	1	-		
Erysipela - - -	5	-	4	-	2	-	5	-	-	-	-	-	-	-		
Erysipela - - -	-	-	104	3	-	-	103	2	13	1	17	-	24	-		
Erysipela - - -	39	3	30	1	28	3	30	4	35	6	26	4	37	4		
Erysipela - - -	118	-	94	-	105	1	91	1	13	3	8	1	9	-		
Erysipela - - -	280	81	260	67	249	64	315	78	41	21	30	18	24	10		
Erysipela - - -	69	3	95	3	86	-	59	3	24	1	29	2	7	-		
Erysipela - - -	6	-	-	-	-	-	3	1	-	-	-	-	-	-		
Erysipela - - -	1	-	1	1	-	-	3	-	1	1	-	-	-	-		
Erysipela - - -	2	2	5	4	10	1	9	6	3	1	5	2	4	2		
Erysipela - - -	-	-	-	-	-	-	1	-	-	-	-	-	-	-		
Erysipela - - -	11	6	4	2	7	2	4	-	-	-	-	-	-	-		
Erysipela - - -	289	121	119	54	99	41	127	43	16	8	19	12	20	12		
Erysipela - - -	79	4	43	4	48	6	69	7	35	-	50	3	33	4		
Erysipela - - -	371	36	174	18	126	16	154	14	1	-	2	-	2	-		
Erysipela - - -	-	-	-	-	13	-	4	-	-	-	-	-	-	-		
Erysipela - - -	-	-	-	-	2	-	2	-	-	-	-	-	-	-		
Erysipela - - -	261	-	147	1	155	-	158	2	17	1	20	3	23	3		
Erysipela - - -	3	-	1	-	3	1	-	-	-	-	1	-	4	2		
Erysipela - - -	41	2	44	1	43	1	67	1	26	-	12	1	25	2		
Erysipela - - -	5	-	3	-	-	-	-	-	-	-	-	-	-	-		
Erysipela - - -	68	1	54	-	52	-	61	1	3	-	3	-	5	-		
Erysipela - - -	6	-	-	-	-	-	1	-	-	-	-	-	-	-		
Erysipela - - -	257	1	212	1	283	-	272	1	55	-	60	-	52	-		
Erysipela - - -	28	-	3	-	4	-	-	-	3	-	2	-	-	-		
Erysipela - - -	78	-	112	-	102	-	226	-	104	-	73	-	62	-		
Erysipela - - -	43	-	16	-	3	-	1	-	4	-	5	-	8	-		
Erysipela - - -	15	-	2	-	1	-	-	-	24	-	23	-	15	-		
Erysipela - - -	392	-	391	-	349	-	347	-	192	-	222	-	216	-		

Note.—The words and figures printed in *italics* were printed in red in the original.

EUROPEAN and NATIVE ANNUITIES, 1860-63—continued

TABLE showing in detail the Causes of Admissions into Hospital, and of Deaths in Hospital, &c.—continued.

DISEASES.	EUROPEAN ARMY.								NATIVE ARMY.							
	1860.		1861.		1862.		1863.		1861.		1862.		1863.			
	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.
Dysœcœa	21	—	40	—	25	—	39	—	7	—	6	—	—	—	7	—
Amaurosis	13	—	19	—	1	—	12	—	5	—	6	—	—	—	7	—
Nyctalopia	—	—	—	—	4	—	—	—	—	—	6	—	—	—	7	—
Pericarditis	—	—	—	—	16	—	—	—	14	—	6	—	—	—	46	—
Endocarditis	24	—	35	2	16	—	11	2	4	—	—	—	—	—	1	—
Palpitation	240	20	252	12	202	7	230	12	6	1	—	—	—	—	12	—
Aneurisma	211	—	95	1	34	—	56	—	1	—	—	—	—	—	1	—
Syncope	6	3	17	5	21	9	10	5	—	—	—	—	—	—	2	—
Angina Pectoris	3	1	10	—	3	—	4	—	2	1	1	—	—	—	—	—
Varix	3	—	7	—	12	1	9	—	1	1	7	—	—	—	3	—
Phlebitis	40	—	23	—	28	—	25	—	1	—	—	—	—	—	8	—
Epistaxis	5	—	4	—	—	—	2	—	1	—	—	—	—	—	—	—
Laryngitis	36	—	25	—	20	—	16	—	6	—	5	—	—	—	2	—
Bronchitis	—	—	20	—	18	1	25	1	11	—	3	—	—	—	6	—
Pleuritis	2,687	13	1,895	13	1,551	13	1,702	11	652	28	556	25	726	20	—	—
Hydrothorax	133	3	201	3	133	2	132	1	109	6	97	4	116	—	—	—
Empyema	2	—	2	—	—	—	—	—	—	—	—	—	—	—	—	—
Pneumonia	2	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Asthma	177	22	166	31	103	16	109	19	134	20	143	28	136	20	—	—
Dyspnoea	37	—	39	1	43	3	34	3	144	6	93	2	112	—	—	—
Stomatitis	18	2	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Pharyngitis	11	—	15	—	12	—	8	—	34	—	13	—	14	—	—	—
Gastritis	3	—	9	—	3	—	4	—	3	—	1	—	1	—	—	—
Enteritis	46	3	42	5	53	2	29	2	13	1	3	—	6	—	—	—
Peritonitis	21	2	18	2	22	8	17	3	3	1	12	5	6	—	—	—
Obstipatio	20	3	19	5	29	10	11	3	15	6	8	1	5	—	—	—
Ileus	287	—	177	—	133	—	108	—	49	—	74	2	55	—	—	—
Hernia	3	1	—	—	5	2	1	—	3	2	—	—	—	—	—	—
Dyspepsia	71	—	51	—	40	—	62	—	19	—	11	—	9	—	—	—
Colica	1,178	2	989	1	935	1	982	1	286	—	304	—	364	—	—	—
Hæmatemesis	1,333	2	822	2	651	—	613	—	663	3	745	1	680	—	—	—
Melœna	9	1	16	—	18	—	15	1	12	1	5	—	10	—	—	—
Hæmorrhœis	1	—	1	—	1	—	—	—	—	—	—	—	—	—	—	—
Fistula in Ano	555	1	495	1	502	1	488	—	114	—	142	—	132	—	—	—
Splenitis	45	1	36	1	44	—	52	—	8	—	14	—	12	—	—	—
Hepatitis	358	3	319	3	388	3	458	1	303	13	326	6	453	13	—	—
Icterus	3,071	169	2,520	104	2,569	104	2,719	124	62	8	70	7	72	—	—	—
Cirrhosis	244	2	270	2	286	4	220	5	39	4	76	2	49	—	—	—
Ascites	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—
Nephritis	19	6	34	2	19	2	23	4	9	4	5	—	4	—	—	—
Albumenuria	42	2	41	2	37	3	41	4	31	1	16	—	21	—	—	—
Hæmaturia	3	—	6	—	—	—	1	—	—	—	—	—	1	—	—	—
Ischuria	6	—	7	—	15	1	12	—	10	—	—	—	6	—	—	—
Eneuresis	27	6	17	1	22	—	21	1	19	1	10	—	12	—	—	—
Diuresis et Diabetes	4	—	12	—	8	—	13	—	—	—	—	—	3	—	—	—
Cystitis	7	—	17	—	15	—	9	—	1	—	1	—	2	—	—	—
Calculus vesicæ	11	—	17	1	16	—	15	—	6	—	1	—	3	—	—	—
Stricture urethræ	—	—	—	—	—	—	—	—	4	3	1	—	—	—	—	—
Fistula in Perineo	128	1	112	—	132	1	126	1	16	—	4	—	13	—	—	—
Varicocele	2	—	1	—	4	—	1	—	1	—	—	—	—	—	—	—
Orchitis	9	—	15	—	6	—	8	—	4	—	1	—	—	—	—	—
Hydrocele	626	—	544	—	735	1	775	—	57	—	84	—	75	—	—	—
Hæmatocele	32	—	15	—	23	—	31	—	23	—	14	—	16	—	—	—
Lumbago	2	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Pleurodynia	155	—	30	—	78	—	80	—	48	—	68	—	80	—	—	—
Arthritis	66	—	22	—	56	—	24	—	2	—	4	—	7	—	—	—
Gynovitis	36	1	30	—	18	—	46	—	3	—	8	—	7	—	—	—
Contractura	55	—	83	—	69	1	85	1	19	1	12	—	2	—	—	—
Periostitis	17	—	16	—	7	—	5	—	7	—	2	—	6	—	—	—
Exostosis	58	—	66	—	84	—	109	1	16	1	11	—	9	—	—	—
Necrosis	5	—	10	—	—	—	—	—	—	—	—	—	—	—	—	—
Caries	12	1	12	1	10	—	23	—	1	—	—	—	1	—	—	—
Skin diseases	8	1	13	—	25	—	5	—	3	—	6	—	2	—	—	—
Phlegmon and Abscess	460	—	311	—	341	—	419	—	501	—	454	—	452	—	—	—
Whitlow	3,154	3	2,269	1	1,965	—	1,790	2	2,192	3	2,154	2	2,376	3	—	—
Floor	175	—	154	1	203	—	168	—	68	—	66	—	97	—	—	—
Umour	2,447	—	1,614	—	1,718	1	1,496	—	2,098	1	2,157	1	2,297	3	—	—
Atrophy and Asthenia	37	2	22	—	26	—	23	—	6	—	4	—	7	—	—	—
Burning	633	11	274	8	453	11	327	7	328	16	308	11	1,222	13	—	—
Dislocation	47	1	39	—	54	2	82	2	—	—	—	—	—	—	—	—
Subluxation	56	—	51	—	44	—	28	—	—	—	—	—	—	—	—	—
Fracture	748	—	643	—	664	—	643	—	—	—	—	—	—	—	—	—
Contusion	169	4	135	3	137	1	144	1	—	—	—	—	—	—	—	—
Concussion of Brain	2,807	5	2,133	2	2,204	—	2,289	2	2,905*	3	3,497*	11	4,279*	20	—	—
Gun-shot wound	1	1	5	—	12	—	8	—	—	—	—	—	—	—	—	—
Incised wound	35	—	17	4	18	2	171	9	—	—	—	—	188	24	—	—
Amputation	326	2	336	—	331	1	350	1	—	—	—	—	—	—	—	—
Poisoning	7	—	8	—	3	1	4	—	—	—	—	—	—	—	—	—
Snake bite	2	1	5	—	2	—	9	1	4	1	—	—	—	—	—	—
Asphyxia	3	—	—	—	1	1	3	—	7	1	—	—	—	—	—	—
Disease not specified	—	—	—	—	1	—	1	—	—	—	—	—	—	—	—	—
Unfinished	705	8	37	—	67	1	48	2	220	—	—	—	—	—	—	—
	42	—	47	—	43	—	50	—	28	—	64	—	64	—	—	—

Note.—The words and figures printed in *italics* were printed in red in the original.

* Injuries of all kinds.

GAOLS OF THE BENGAL PRESIDENCY, 1859-63.

TABLE showing in detail the CAUSES of ADMISSIONS into HOSPITAL, and of DEATHS in HOSPITAL, in the GAOLS of the Bengal Presidency, for the Years 1859-63.

DISEASES.	1859.		1860.		1861.		1862.		1863.	
	Av. Strength	46,733	Av. Strength	46,348	Av. Strength	50,915	Av. Strength	52,871	Av. Strength	52,401
	No. daily sick	2,473	No. daily sick	2,666	No. daily sick	2,458	No. daily sick	2,463	No. daily sick	2,555
	Admissions	- 62,218	Admissions	- 69,058	Admissions	- 66,667	Admissions	- 71,028	Admissions	- 71,659
	Deaths	- 3,868	Deaths	- 5,134	Deaths	- 4,920	Deaths	- 3,526	Deaths	- 4,498
	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.
Variola - - - -	74	11	95	20	50	3	83	2	66	5
Varicella - - - -	139	1	57	-	75	-	87	-	619	2
Morbili - - - -	1	-	5	-	4	-	1	-	2	-
Scarlatina - - - -	-	-	-	-	-	-	-	-	1	-
Tonsillitis - - - -	47	1	30	-	28	-	22	-	44	1
Parotitis - - - -	143	-	102	-	94	1	124	-	123	1
Febris Intermittens - -	18,095	203	19,042	267	22,772	409	25,531	216	24,394	291
" Remittens - -	1,677	173	3,147	512	3,719	651	4,226	651	3,086	462
" Continua - -	1,019	77	3,004	260	679	76	1,099	99	1,733	139
Ophthalmia - - - -	1,516	25	1,419	9	1,017	19	1,045	8	1,153	34
Erysipelas - - - -	50	1	48	3	60	8	48	5	84	8
Erythema - - - -	16	1	29	-	4	-	11	-	4	-
Pyæmia - - - -	1	1	1	1	1	-	-	-	2	2
Gangræna et Phagedæna -	20	6	19	10	75	20	49	7	144	17
Anthrax - - - -	46	1	47	1	50	2	38	-	68	1
Furunculus - - - -	7	-	9	-	92	-	145	-	103	-
Influenza - - - -	4	-	1	-	67	-	50	1	45	-
Dysentery - - - -	7,253	1,243	7,626	1,337	6,904	1,162	6,911	850	7,953	1,219
Diarrhœa - - - -	5,785	610	6,171	571	6,091	797	6,246	627	6,835	695
Cholera - - - -	861	401	2,674	1,004	1,859	774	803	292	1,873	751
Rheumatismus - - - -	1,980	37	1,638	23	1,493	21	1,633	14	1,567	17
Syphilis Primaria - -	342	-	365	-	461	7	524	1	557	3
" Secundaria - -	221	3	171	2	234	4	254	6	191	-
Iritis Syphilitica - -	-	-	-	-	6	-	1	-	2	-
Gonorrhœa - - - -	158	-	122	-	159	-	136	-	126	-
Bubo - - - -	135	2	148	-	122	1	98	-	162	-
Phymosis - - - -	26	-	46	-	43	-	48	1	32	-
Orchitis - - - -	5	-	15	1	40	-	47	1	51	-
Condyloma - - - -	2	-	4	-	1	-	4	-	4	-
Elephantiasis - - - -	21	1	14	-	9	1	9	-	18	-
Lepra - - - -	110	8	91	13	115	12	93	3	115	12
Hydrophobia - - - -	1	-	-	-	-	-	-	-	2	2
Scorbutus - - - -	524	29	376	23	418	34	327	20	274	8
Ebriositas - - - -	-	-	2	-	3	-	6	-	-	-
Bronchocele - - - -	8	-	10	-	5	-	8	-	3	-
Aphthæ - - - -	37	-	29	-	31	-	16	-	26	-
Porrigio - - - -	1	-	8	-	16	-	16	-	8	-
Scabies - - - -	1,324	3	1,167	-	895	-	1,540	-	1,713	1
Vermes - - - -	30	-	19	-	25	1	27	1	23	-
" Tænia - - - -	4	-	4	-	9	-	5	-	6	-
" Dracunculus - -	174	-	225	-	238	3	148	-	151	-
Scirrhus - - - -	4	1	9	5	3	3	9	3	4	1
Lupus - - - -	-	-	-	-	-	-	1	-	1	-
Anæmia - - - -	72	5	155	30	141	18	167	17	191	24
Anasarca - - - -	208	60	175	67	202	64	227	52	225	64
Scrofula - - - -	29	33	33	1	53	4	36	1	53	4
Phthisis Pulmonary - -	208	139	189	133	136	100	159	94	167	102
Hæmoptysis - - - -	45	4	38	4	44	3	45	5	61	7
Abscessus Psoanus - -	-	-	-	-	-	-	2	1	-	-
Meningitis - - - -	2	1	4	2	7	8	1	1	15	8
Myelitis - - - -	-	-	-	-	1	1	-	-	1	1
Encephalitis - - - -	1	1	-	-	5	1	4	4	3	3
Apoplexia - - - -	40	30	50	34	47	32	41	26	29	21
Paralysis - - - -	56	15	57	11	43	15	65	10	35	6
Delirium Tremens - -	3	-	1	-	1	-	1	-	1	-
Hysteria - - - -	1	-	3	-	-	-	-	-	2	-
Chorea - - - -	2	-	2	-	-	-	1	-	-	-
Epilepsia - - - -	73	3	98	9	75	4	78	7	82	6
Tetanus - - - -	6	5	8	7	7	6	4	4	6	5
Mania - - - -	307	14	327	20	247	8	222	6	251	13
Dementia - - - -	4	2	6	3	27	4	35	3	16	-
Cephalæa - - - -	336	1	288	-	259	-	179	1	167	-
Neuralgia - - - -	149	-	85	1	109	-	86	-	84	-
Odontalgia - - - -	165	-	96	-	77	-	62	-	57	-
Otitis - - - -	209	-	195	1	184	-	206	-	184	-
Dyseecœa - - - -	-	-	1	-	1	-	-	-	-	-
Amaurosis et Cæcitas -	8	-	2	-	32	-	26	-	18	-
Pericarditis - - - -	13	6	6	2	18	10	10	4	11	6
Endocarditis - - - -	17	7	8	6	8	6	5	6	10	9
Palpitatio - - - -	-	-	3	-	1	-	-	-	-	-

Note.—The words and figures printed in *italics* were printed in red in the original.

* It is evident that in all cases the actual cause of death is not recorded, the death being returned in some instances under the heading of the disease which was originally the cause of admission into hospital.

GAOLS OF THE BENGAL PRESIDENCY, 1859-63—*continued.*TABLE showing in detail the Causes of Admissions into Hospitals, and of Deaths in Hospital, &c.—*continued.*

DISEASES.	1859.		1860.		1861.		1862.		1863.	
	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.
Aneurisma - - -	1	1	-	-	-	-	-	-	1	-
Syncope - - -	-	-	-	-	-	-	-	-	1	-
Varix - - -	2	-	1	-	1	1	2	-	1	-
Phlebitis - - -	5	1	1	-	7	1	4	-	1	-
Epistaxis - - -	7	-	23	-	22	-	18	-	5	-
Laryngitis - - -	20	1	10	2	18	-	24	1	8	-
Bronchitis - - -	1,691	65	1,232	66	913	70	704	53	905	2
Pleuritis - - -	345	23	356	29	301	23	277	14	306	60
Hydrothorax - - -	-	-	-	-	7	6	6	5	6	15
Empyema - - -	-	-	-	-	2	2	-	-	1	6
Pneumonia - - -	446	128	386	117	347	98	299	87	357	-
Asthma - - -	204	22	207	17	184	17	239	22	357	93
Gangrena Pulmonum - - -	6	6	5	4	3	3	3	3	232	20
Ozena - - -	2	-	2	1	-	-	-	-	-	-
Stomatitis - - -	10	-	7	-	6	-	11	-	25	3
Pharyngitis - - -	-	-	-	-	-	-	-	-	1	-
Gastritis - - -	24	6	14	2	21	2	12	-	16	2
Enteritis - - -	19	3	15	8	7	5	17	11	19	8
Peritonitis - - -	12	6	9	7	20	13	4	3	14	8
Obstipatio - - -	1,194	-	900	1	582	1	597	-	565	-
Ileus - - -	1	-	-	-	2	2	2	2	5	5
Hernia - - -	23	2	19	2	20	-	28	1	31	2
Dyspepsia - - -	942	9	1,126	8	902	7	757	3	650	3
Colica - - -	1,891	2	1,742	6	1,654	15	1,487	7	1,517	4
Hæmatemesis - - -	5	-	6	4	2	1	12	3	20	3
Melæna - - -	-	-	-	-	2	1	-	-	1	1
Hæmorrhoids - - -	250	1	197	-	182	3	206	4	178	5
Fistula in Ano - - -	15	1	23	-	25	1	28	-	29	-
Splenitis - - -	246	11	232	16	264	19	357	18	342	18
Hepatitis - - -	66	16	70	22	64	15	52	9	59	7
Icterus - - -	116	18	141	33	65	15	65	6	65	7
Cirrhosis - - -	-	-	-	-	-	-	2	-	1	1
Ascites - - -	47	28	36	23	20	12	33	22	36	14
Nephritis - - -	13	1	16	5	10	1	80	21	64	25
Albumenuria - - -	-	-	-	-	-	-	1	-	1	-
Hæmaturia - - -	11	1	1	1	12	1	16	-	14	1
Ischuria - - -	24	-	23	4	18	-	25	1	13	1
Enuresis - - -	2	-	2	-	-	-	-	-	2	1
Diuresis et Diabetes - - -	5	1	10	1	10	1	1	-	6	-
Cystitis - - -	3	1	12	3	11	4	6	1	7	3
Calculus Vesicæ - - -	3	-	6	-	4	1	3	-	10	-
Stricture Urethræ - - -	33	-	30	1	27	-	27	1	22	1
Fistula in Perineo - - -	6	-	3	-	-	-	-	-	2	1
Varicocele - - -	2	-	-	-	-	-	-	-	1	-
Orbitis - - -	56	-	55	-	43	-	44	-	43	2
Hydrocele - - -	31	-	31	-	46	-	60	-	57	-
Synovitis - - -	13	-	27	-	22	-	15	1	46	-
Contractura - - -	3	-	1	-	1	-	6	-	-	-
Periostitis - - -	21	2	9	1	14	1	13	-	18	-
Necrosis - - -	7	-	10	-	9	-	11	1	5	-
Caries - - -	2	-	5	-	9	1	15	-	17	-
Skin Diseases - - -	341	1	375	-	443	1	684	-	689	-
Phlegmon and Abscess - - -	3,501	18	3,730	21	3,847	19	4,722	18	4,211	20
Whitlow - - -	70	-	101	-	112	-	100	-	106	-
Ulcer - - -	3,087	39	3,267	31	3,737	40	4,091	30	3,357	23
Tumour - - -	40	1	26	-	21	-	26	1	21	1
Atrophy and Asthenia - - -	990	268	2,472	269	684	194	658	98	600	133
Burning - - -	72	-	80	1	94	2	86	3	90	1
Dislocation - - -	16	1	19	-	8	-	10	-	8	-
Subluxation - - -	19	-	27	-	18	-	23	-	19	-
Fracture - - -	124	7	187	10	208	8	178	11	162	5
Contusion - - -	1,847	10	1,600	12	1,565	11	1,438	9	1,339	1
Concussion of Brain - - -	3	2	2	2	3	1	1	1	3	3
Gun-shot Wound - - -	25	6	18	-	6	-	6	-	5	1
Incised Wound - - -	302	22	300	9	307	13	292	4	266	12
Amputation - - -	6	-	-	-	-	-	-	-	-	-
Poisoning - - -	3	1	3	1	8	2	5	-	9	3
Snake-bite - - -	4	1	4	-	6	2	5	1	4	1
Disease not specified - - -	38	-	27	-	28	1	8	-	-	-

Note.—The words and figures printed in *italics* were printed in red in the original.

GAOLS OF THE BENGAL PRESIDENCY, 1859-63—*continued.*TABLE showing in detail the Causes of Admissions into Hospitals, and of Deaths in Hospital, &c.—*continued.*

RATIOS OF ADMISSIONS AND DEATHS.

	Admitted per Cent. of Average Strength.					Died per 1,000 of Average Strength.				
	1859.	1860.	1861.	1862.	1863.	1859.	1860.	1861.	1862.	1863.
Cholera - - - -	1·84	5·77	3·65	1·52	3·58	8·58	21·66	15·21	5·52	14·33
Small Pox - - -	·16	·20	·10	·16	·13	·24	·43	·06	·04	·10
Fevers - - - -	44·49	54·36	53·36	58·36	53·75	9·70	22·42	22·31	18·27	17·40
Dysentery and Diarrhoea -	27·90	29·77	25·52	24·88	28·22	39·65	41·17	38·47	27·94	36·53
Hepatitis - - -	·14	·15	·12	·10	·11	·34	·47	·30	·17	·13
Spleen Diseases - -	·53	·50	·52	·68	·65	·24	·35	·37	·34	·34
Ophthalmia - - -	3·24	3·06	2·00	1·98	2·20	—	—	—	—	—
Rheumatism - - -	4·24	3·53	2·61	2·93	2·74	—	—	—	—	—
Scurvy - - - -	1·12	·81	·82	·62	·52	·62	·49	·67	·38	·15
Dropsy - - - -	·55	·45	·45	·50	·51	1·88	1·94	1·59	1·49	1·60
Atrophy and Anæmia -	2·27	5·67	1·62	1·55	1·51	5·84	6·45	4·16	2·14	3·65
Phthisis Pulmonalis -	·45	·41	·27	·30	·32	2·97	2·96	2·02	1·87	2·08
Apoplexy - - -	·09	·11	·09	·08	·06	·64	·74	·63	·49	·40
Respiratory Diseases -	5·80	4·74	3·47	2·93	3·45	5·24	5·07	4·18	3·40	3·63
Abscess and Ulcer - -	14·13	15·32	11·79	12·64	11·69	1·22	1·12	1·16	·85	·82
Injury - - - -	5·37	4·83	4·73	4·05	3·63	1·07	·75	·77	·59	·52
All other Causes - -	21·81	19·50	20·30	21·33	21·81	4·54	4·79	4·75	3·26	4·16
	133·63	149·18	131·42	134·61	136·88	82·77	110·81	96·65	66·75	85·84

Note.—The words and figures printed in *italics* were printed in red in the original.

EUROPEAN TROOPS, 1859.

TABLE showing the SICKNESS and MORTALITY among the EUROPEAN TROOPS serving in the *Bengal* Presidency during the Year 1859, and the prevalence of the principal Diseases in each Month of the Year.

MONTHS.	Average Strength.	Average Number Daily Sick.	Daily Sick per cent. of Average Strength.	Number of Deaths.	Died per 1,000 of Average Strength.	CAUSES OF DEATHS IN HOSPITAL.																	
						Cholera.	Small-pox.	Intermittent Fevers.	Remittent Fevers.	Continued Fevers.	Dysentery, Acute.	Dysentery, Chronic.	Diarrhoea.	Hepatitis, Acute.	Hepatitis Chronic.	Phthisis Pulmonalis.	Heat Apoplexy.	Delirium Tremens.	Respiratory Diseases.	Heart Diseases.	All other Diseases.	Wounds and Accidents.	
January -	51,512	3,957	7.70	97	-	1	9	2	3	4	23	7	10	6	7	7	1	3	2	2	7	3	
February -	51,562	4,036	7.82	65	-	-	1	1	2	4	11	7	4	5	9	6	2	-	6	1	5	1	
March -	54,454	4,529	8.31	115	-	8	2	4	4	15	23	8	9	9	10	9	1	4	2	1	6	-	
April -	58,036	5,339	9.20	211	-	34	2	4	15	28	59	10	14	11	11	5	5	2	5	1	5	-	
May -	60,433	5,827	9.64	341	-	107	3	6	25	31	61	8	15	11	6	11	25	3	4	4	18	3	
June -	60,977	6,125	10.05	306	-	31	-	9	12	25	49	14	11	8	10	6	98	4	6	4	17	2	
July -	60,568	6,059	10.00	266	-	30	1	7	12	21	43	8	9	13	8	13	73	3	1	2	20	2	
August -	56,838	5,601	9.85	418	-	217	-	1	6	16	65	7	22	24	16	11	9	2	2	2	15	3	
September -	54,504	5,014	9.38	207	-	24	-	7	12	12	59	10	14	29	8	11	4	6	2	2	12	1	
October -	51,837	4,825	9.31	182	-	21	-	7	22	15	33	7	9	20	9	4	3	7	7	3	12	3	
November -	50,903	4,624	9.08	132	-	3	-	7	9	13	26	3	5	15	8	9	2	2	4	5	19	2	
December -	49,581	3,770	7.60	83	-	2	-	2	2	4	19	2	9	8	7	6	3	2	10	1	6	-	
						478	18	51	124	188	471	91	131	159	109	98	226	38	51	28	142	20	
Died per 1,000 of Average Strength.																							
	55,104	4,975	9.03	2,423	43.97	8.67	.32	.92	2.25	3.41	8.55	1.65	2.38	2.88	1.98	1.78	4.10	.69	.9	.51	2.57	.36	

Deaths out of Hospital, 76. Died per 1,000 of Average Strength, 1.38.

DISEASES.	NUMBER OF ADMISSIONS INTO HOSPITAL IN EACH MONTH.												Total Admissions during the Year.	Admitted per Cent. of Average Strength.	Died per Cent. of Admissions.
	Jan.	Feb.	March.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.			
Cholera - - - -	9	7	32	67	206	55	77	370	47	41	6	7	924	1.68	50.17
Small-pox - - -	28	18	20	27	14	7	4	-	-	-	1	3	122	.22	14.75
Intermittent Fevers - - -	702	587	975	1,736	1,771	2,003	1,839	1,272	1,243	2,135	2,417	1,654	18,334	79.21	.83
Remittent Fevers - - -	72	114	257	453	593	692	732	480	607	1,119	793	306	6,218		
Continued Fevers - - -	289	351	1,375	2,272	2,607	2,801	2,995	1,706	1,371	1,610	1,219	502	19,098		
Dysentery, Acute - - -	267	272	404	576	637	504	592	647	581	413	307	231	5,431	11.87	8.60
" Chronic - - -	93	83	114	89	82	90	100	89	94	114	76	79	1,103		
Diarrhoea - - - -	452	436	705	882	916	798	1,048	1,204	870	542	495	419	8,767		
Hepatitis, Acute - - -	140	151	159	201	220	203	185	219	244	186	133	128	2,169	6.70	7.25
" Chronic - - -	152	136	121	89	164	128	151	150	124	126	90	96	1,527		
Ophthalmia - - - -	342	427	529	460	513	390	391	345	332	395	309	265	4,698		
Rheumatism - - - -	432	369	448	348	380	368	406	402	341	339	297	337	4,467	8.11	
Venereal Diseases - - -	1,848	1,728	1,997	1,881	1,992	1,518	1,600	1,525	1,371	1,487	1,463	1,367	19,777	35.90	
Phthisis Pulmonalis - -	31	23	30	31	42	27	31	45	34	20	28	27	369	.67	26.55
Heat Apoplexy - - - -	3	10	6	13	55	194	138	31	16	5	3	4	478	.87	47.28
Delirium Tremens - - -	44	28	38	41	52	51	44	46	57	49	32	27	509	.92	7.46
Epilepsy - - - - -	30	25	27	17	35	22	28	28	29	28	35	24	328	.59	
Respiratory Diseases - -	379	375	427	387	450	317	358	348	291	323	434	351	4,440	8.05	1.14
Abscess and Ulcer - - -	505	536	613	596	622	787	851	647	566	506	489	460	7,178	13.02	
Wounds and Accidents - -	631	512	615	444	504	445	364	332	370	393	424	446	5,480	9.94	
All other Diseases - - -	797	789	970	945	1,066	1,232	1,360	1,102	989	734	699	707	11,390	20.67	.35
	7,246	6,977	9,862	11,555	12,921	12,632	13,294	10,988	9,577	10,565	9,750	7,440	122,807		
Admitted per cent. of Average Strength in each Month.															
	14.06	13.53	18.11	19.91	21.38	20.71	21.95	19.33	17.57	20.38	19.15	15.01	222.85		

EUROPEAN TROOPS, 1859—continued.

TABLE showing the SICKNESS and MORTALITY among the EUROPEAN TROOPS serving in *Bengal* Proper during the Year 1859, and the prevalence of the principal Diseases in each Month of the Year.

MONTHS.	Average Strength.	Average Number Daily Sick.	Daily Sick per Cent. of Average Strength.	Number of Deaths.	Died per 1,000 of Average Strength.	CAUSES OF DEATH.																	
						Cholera.	Small-pox.	Intermittent Fevers.	Remittent Fevers.	Continued Fevers.	Dysentery, Acute.	Dysentery, Chronic.	Diarrhoea.	Hepatitis, Acute.	Hepatitis, Chronic.	Phthisis Pulmonalis.	Heat Apoplexy.	Delirium Tremens.	Respiratory Diseases.	Heart Diseases.	All other Diseases.	Wounds and Accidents.	
January -	4,689	273	5·83	3	-	1	-	-	-	1	2	-	-	-	-	-	2	-	-	-	-	-	
February -	5,201	253	4·88	6	-	-	-	-	-	1	4	-	-	-	-	-	-	-	-	-	-	-	
March -	6,643	394	5·93	17	-	8	-	-	1	2	-	-	-	-	-	-	2	-	-	-	-	-	
April -	5,278	310	5·88	11	-	2	-	-	-	1	3	-	-	-	-	-	1	-	-	-	2	-	
May -	5,331	398	7·48	16	-	5	1	-	1	1	1	-	1	-	-	-	2	-	-	-	4	-	
June -	5,537	481	8·69	13	-	4	-	-	1	1	2	3	1	-	-	-	1	-	-	-	-	-	
July -	5,866	557	9·50	23	-	1	-	-	3	3	7	1	3	-	-	-	2	-	-	-	2	-	
August -	7,232	589	8·14	123	-	95	-	-	-	3	14	-	7	1	-	-	-	-	1	-	2	-	
September	7,686	459	5·97	26	-	3	-	1	1	-	10	1	3	3	-	2	-	-	-	-	2	-	
October -	6,549	432	6·61	35	-	15	-	1	4	1	3	1	5	-	-	-	1	1	-	-	-	2	
November	4,448	369	8·30	14	-	1	-	-	1	3	2	-	1	-	-	-	1	1	-	-	2	-	
December	4,503	247	5·50	6	-	-	-	-	-	-	2	-	1	-	1	-	-	1	-	-	1	-	
						135	1	2	13	16	50	6	22	4	5	5	6	6	5	-	15	2	
Died per 1,000 of Average Strength.																							
						23·49	·18	·35	2·26	2·78	8·70	1·04	3·83	·70	·87	·87	1·04	1·04	·87	-	2·61	·35	

DISEASES.	NUMBER OF ADMISSIONS INTO HOSPITAL IN EACH MONTH.												Total Admissions during the Year.	Admitted per Cent. of Average Strength.	Died per Cent. of Admissions.			
	Jan.	Feb.	March.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.						
Cholera -	4	1	18	6	7	6	4	166	9	27	1	1	250	4·35	54·00			
Small-pox -	-	-	-	-	2	-	-	-	-	-	-	-	2	·03	50·00			
Intermittent Fevers -	29	14	27	17	42	209	37	66	85	182	169	107	984	60·83	·88			
Remittent Fevers -	4	16	11	7	166	136	84	56	4	10	3	1	498					
Continued Fevers -	21	21	88	220	243	200	522	223	199	169	78	30	2,014					
Dysentery, Acute -	18	14	47	28	23	42	79	67	83	51	28	27	507	9·79	9·95			
" Chronic -	3	2	5	3	4	3	11	1	10	10	3	1	56					
Diarrhoea -	50	46	78	102	71	56	146	209	105	87	42	22	1,014	17·66	2·16			
Hepatitis, Acute -	6	6	7	5	6	5	8	18	26	13	13	15	128	3·19	4·86			
" Chronic -	3	5	3	3	3	3	1	8	8	5	2	13	57					
Ophthalmia -	30	18	29	14	16	23	36	22	33	34	25	6	286					
Rheumatism -	29	27	27	20	19	32	36	49	26	30	22	35	352	6·12	17·24			
Veneral Diseases -	103	91	211	113	118	120	114	177	181	148	110	84	1,570	27·31				
Phthisis Pulmonalis -	4	-	2	1	1	2	-	3	5	5	4	2	29	·50				
Heat Apoplexy -	-	-	-	1	4	1	3	1	3	-	-	-	13	·22	46·15			
Delirium Tremens -	21	12	18	14	23	9	7	13	6	6	7	4	140	2·43	4·28			
Epilepsy -	2	2	6	1	4	1	3	3	2	8	4	1	37	·64	1·08			
Respiratory Diseases -	43	43	31	44	36	32	48	57	37	25	32	32	460	8·00				
Abscess and Ulcer -	60	58	76	37	81	81	99	69	68	45	33	32	739	12·85				
Wounds and Accidents -	41	28	47	21	46	43	27	30	52	45	30	35	445	7·74	21·54			
All other Diseases -	54	76	96	91	110	182	156	150	140	87	86	60	1,238	21·54				
													10,819					
Admitted per cent. of Average Strength in each Month.																		
													11·19	9·22		12·45		
													14·17	19·22	20·51			
													24·22	19·19	14·07			
													15·07	15·51	11·28			

EUROPEAN TROOPS, 1859—continued.

TABLE showing the SICKNESS and MORTALITY among the EUROPEAN TROOPS serving in the *Dinapore*, *Benares*, and *Oude* Districts, during the Year 1859, and the Prevalence of the principal Diseases in each Month of the Year.

MONTHS.	CAUSES OF DEATH.																						
	Average Strength.	Average Number Daily Sick.	Daily Sick per Cent. of Average Strength.	Number of Deaths.	Died per 1,000 of Average Strength.	Cholera.	Small-pox.	Intermittent Fevers.	Remittent Fevers.	Continued Fevers.	Dysentery, Acute.	Dysentery, Chronic.	Diarrhoea.	Hepatitis, Acute.	Hepatitis, Chronic.	Phthisis Pulmonalis.	Heat Apoplexy.	Delirium Tremens.	Respiratory Diseases.	Heart Diseases.	All other Diseases.	Wounds and Accidents.	
January -	20,814	1,723	8.23	39	-	-	1	-	1	1	14	3	6	3	3	2	-	-	1	1	2	1	
February -	19,371	1,748	9.03	26	-	-	-	-	-	-	8	3	1	3	4	-	1	-	4	1	1	1	
March -	19,845	1,862	9.38	51	-	6	-	-	-	10	14	4	6	7	4	1	-	-	1	1	3	-	
April -	19,333	2,015	10.89	94	-	9	-	-	15	10	39	2	4	5	3	3	4	-	2	2	3	-	
May -	18,667	2,111	11.31	99	-	11	-	1	8	15	30	5	4	5	2	2	15	1	2	4	3	-	
June -	18,359	2,193	11.94	108	-	10	-	-	3	12	22	5	1	7	3	6	24	2	1	-	5	-	
July -	18,182	2,273	12.50	103	-	43	-	1	2	6	31	3	6	8	3	4	2	1	-	-	6	2	
August -	16,743	2,086	12.46	123	-	14	-	-	4	4	30	4	4	18	1	4	1	2	-	1	4	1	
September -	15,221	1,840	12.08	92	-	2	-	1	9	7	14	4	3	9	2	1	1	3	4	2	2	-	
October -	14,041	1,836	13.08	65	-	2	-	2	3	7	10	2	-	5	3	2	-	1	2	3	5	-	
November -	14,811	1,798	12.14	47	-	-	-	1	1	2	7	-	4	4	3	2	1	-	2	1	3	-	
December -	14,433	1,420	9.83	31	-	-	-	-	-	2	7	-	-	4	3	2	1	-	2	1	3	-	
						97	1	7	56	86	256	39	45	79	42	28	49	11	20	14	40	8	
Died per 1,000 of Average Strength.																							
	17,485	1,909	10.92	878	50.21	5.55	.05	.40	3.20	4.92	14.64	2.23	2.57	4.52	2.40	1.60	2.80	.63	1.15	.80	2.29	.46	
DISEASES.	NUMBER OF ADMISSIONS INTO HOSPITAL IN EACH MONTH.												Total Admissions during the Year.	Admitted per Cent. of Average Strength.	Died per Cent. of Admissions.								
	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.											
Cholera -	1	1	8	14	14	25	23	73	24	6	5	3	197	1.12	49.24								
Small-pox -	6	1	4	3	-	2	1	-	-	-	-	-	17	.09	6.00								
Intermittent fevers -	167	157	220	348	318	291	307	213	112	343	720	631	3,827	80.00	1.06								
Continued fevers -	40	64	85	277	253	362	490	218	200	577	529	241	3,336										
Dysentery, acute -	132	151	590	796	644	650	1,031	639	520	746	687	287	6,813	18.13	9.30								
Dysentery, chronic -	159	149	219	357	354	307	317	324	222	148	111	87	2,754										
Diarrhoea -	27	27	35	27	36	37	58	49	31	45	25	20	417	7.84	8.83								
Hepatitis, acute -	178	191	294	387	333	312	325	347	296	142	129	138	3,072										
Hepatitis, chronic -	82	70	83	92	91	84	91	88	109	59	36	41	926	12.49	24.35								
Phthisis pulmonalis -	48	41	34	26	53	37	52	44	27	31	29	23	445										
Heat apoplexy -	184	218	253	253	202	159	182	141	143	215	132	102	2,184	7.11	37.40								
Delirium tremens -	157	128	125	119	110	87	98	98	90	74	74	84	1,244										
Respiratory diseases -	891	776	822	794	783	589	684	660	541	578	562	492	8,172	46.73	8.53								
Heart diseases -	5	13	7	7	16	11	12	14	8	7	11	4	115	.65	24.35								
All other diseases -	-	1	3	1	16	42	57	4	4	2	-	1	131	.75	37.40								
Wounds and accidents -	9	6	9	13	7	23	8	12	14	16	5	7	129	.73	8.53								
Deaths -	8	9	9	5	12	4	3	7	7	4	10	5	83	.47	-								
Respiratory diseases -	143	124	118	115	116	69	93	81	84	90	80	67	1,180	6.75	1.70								
Dysentery and ulcer -	171	167	183	210	187	216	262	181	176	141	145	153	2,192	12.53	-								
Wounds and accidents -	166	127	149	124	130	78	100	73	73	70	73	107	1,272	7.21	-								
Other diseases -	264	264	310	308	308	290	340	283	306	219	207	191	3,290	18.81	-								
	2,840	2,685	3,560	4,216	3,983	3,675	4,534	3,549	2,987	3,513	3,570	2,684	41,796										
Admitted per Cent. of Average Strength in each Month.																							
	13.64	13.86	18.00	21.81	21.34	20.00	24.93	21.19	19.62	25.02	24.10	18.60	239.03										

EUROPEAN TROOPS, 1859—continued.

TABLE showing the SICKNESS and MORTALITY among the EUROPEAN TROOPS serving in the *Cawnpore, Meerut, and Rohilcund* Districts, during the Year 1859, and the Prevalence of the principal Diseases in each Month of the Year.

MONTHS.	Average Strength.	Average Number Daily Sick.	Daily Sick per Cent. of Average Strength.	Number of Deaths.	Died per 1,000 of Average Strength.	CAUSES OF DEATH.																
						Cholera.	Small-pox.	Intermittent Fevers.	Remittent Fevers.	Continued Fevers.	Dysentery, Acute.	Dysentery, Chronic.	Diarrhoea.	Hepatitis, Acute.	Hepatitis, Chronic.	Phthisis Pulmonalis.	Heat Apoplexy.	Delirium Tremens.	Respiratory Diseases.	Heart Diseases.	All other Diseases.	
January -	11,875	903	7·61	29	-	-	1	1	1	1	6	3	2	1	1	2	1	1	1	-	5	
February -	12,838	944	7·35	13	-	-	-	-	1	-	-	-	3	1	1	3	1	-	1	1	1	
March -	11,688	1,160	9·92	19	-	-	1	2	1	2	3	3	2	3	2	1	-	-	-	-	2	
April -	12,713	1,395	10·97	60	-	26	1	2	2	3	13	4	4	3	1	-	1	-	-	-	-	
May -	13,794	1,193	10·82	169	-	91	2	2	7	13	12	3	8	5	-	-	16	2	2	1	3	
June -	14,070	1,427	10·14	84	-	14	-	4	1	3	7	1	4	1	5	-	30	2	2	-	9	
July -	13,776	1,364	9·91	65	-	13	-	3	2	2	6	-	3	2	-	2	27	-	-	-	5	
August -	11,000	1,084	9·86	124	-	78	-	-	2	1	12	3	6	3	5	4	4	1	-	1	4	
September -	10,849	1,062	9·79	46	-	6	-	-	3	6	11	2	3	3	3	3	1	1	-	-	4	
October -	11,243	1,007	8·96	45	-	3	-	2	5	5	10	-	1	6	3	1	2	2	-	-	5	
November -	10,192	1,018	9·98	22	-	-	-	1	-	1	7	1	-	4	-	2	2	-	-	-	3	
December -	9,261	811	8·76	14	-	1	-	-	1	-	2	1	-	3	1	2	1	1	1	-	-	
						232	4	16	27	36	88	21	36	35	22	20	86	10	7	3	41	
Died per 1,000 of Average Strength.																						
	11,941	1,139	9·54	690	57·78	19·43	·33	1·34	2·26	3·01	7·37	1·76	3·01	2·93	1·84	1·67	7·20	·83	·58	·25	3·43	
DISEASES.	NUMBER OF ADMISSIONS INTO HOSPITAL IN EACH MONTH.													Total Admissions during the Year	Admitted per Cent. of Average Strength.	Died per Cent. of Admissions.						
	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.										
Cholera -	2	2	3	45	178	21	22	121	12	5	-	2	413	3·46	56·17							
Small-pox -	3	3	3	9	7	1	-	-	-	-	-	3	29	·24	13·80							
Intermittent fevers -	134	125	376	560	461	525	550	236	321	391	434	250	4,363	80·43	·82							
Remittent fevers -	19	17	122	93	61	58	54	25	71	123	64	28	735									
Continued fevers -	82	98	482	672	544	722	570	270	317	421	207	121	4,506									
Dysentery, acute -	57	77	81	128	136	88	104	142	175	125	77	58	1,248	12·80	7·18							
Dysentery, chronic -	17	24	22	31	15	26	12	19	32	41	25	17	281									
Diarrhoea -	105	84	167	193	247	205	265	288	194	131	144	97	2,120									
Hepatitis, acute -	28	36	23	69	62	55	38	45	55	55	43	30	539	17·75	1·70							
Hepatitis, chronic -	32	42	31	30	36	34	39	49	39	58	27	25	442									
Ophthalmia -	59	124	92	90	152	91	93	68	77	69	59	86	1,060									
Rheumatism -	83	73	86	66	82	82	79	78	66	78	60	72	905	8·88	5·81							
Veneral diseases -	469	434	432	396	423	343	294	216	255	384	294	318	4,258									
Phthisis pulmonalis -	8	3	4	5	6	3	9	11	8	4	6	6	73	7·58	27·40							
Heat apoplexy -	1	3	-	5	23	58	42	12	4	1	3	1	153									
Delirium tremens -	10	3	4	3	11	10	10	13	20	14	5	5	108									
Epilepsy -	8	5	8	2	8	6	5	3	8	5	8	3	69	8·07	·72							
Respiratory diseases -	72	68	87	89	113	80	72	81	53	70	96	83	964									
Abscess and ulcer -	143	164	164	150	136	212	209	146	123	133	163	131	1,874									
Wounds and accidents -	190	168	150	115	138	148	107	104	112	103	124	128	1,587	24·02	·80							
All other diseases -	209	215	237	219	303	368	340	257	213	181	160	166	2,868									
	1,731	1,768	2,574	2,970	3,142	3,136	2,914	2,184	2,155	2,392	1,999	1,630	28,595									
Admitted per Cent. of Average Strength in each Month.																						
	14·58	13·77	22·02	23·36	22·78	22·29	21·15	19·85	19·86	21·27	19·61	17·60	240·00									

EUROPEAN TROOPS, 1859—continued.

TABLE showing the SICKNESS and MORTALITY among the EUROPEAN Troops serving in the Agra District and in Central India during the Year 1859, and the Prevalence of the principal Diseases in each Month of the Year.

MONTHS.	Average Strength.	Average Number Daily Sick.	Daily Sick per Cent. of Average Strength.	Number of Deaths.	Died per 1,000 of Average Strength.	CAUSES OF DEATH.																	
						Cholera.	Small-pox.	Intermittent Fevers.	Remittent Fevers.	Continued Fevers.	Dysentery, Acute.	Dysentery, Chronic.	Diarrhoea.	Hepatitis, Acute.	Hepatitis, Chronic.	Phthisis Pulmonalis.	Heat Apoplexy.	Delirium Tremens.	Respiratory Diseases.	Heart Diseases.	All other Diseases.	Wounds and Accidents.	
January	1,222	84	6·91	1	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
February	1,819	74	4·07	2	-	-	1	-	-	-	-	-	1	-	-	-	-	-	-	-	1	-	-
March	2,751	191	7·00	5	-	-	-	-	-	3	1	-	1	-	-	-	-	-	-	-	-	-	-
April	3,139	242	7·71	14	-	-	1	-	2	6	1	3	2	-	-	-	1	1	-	-	2	-	-
May	4,562	330	7·24	13	-	-	-	1	-	1	1	3	1	-	-	-	3	1	-	-	1	1	-
June	4,509	377	8·38	16	-	2	-	1	-	-	2	1	1	1	-	-	4	1	1	-	1	1	-
July	4,295	408	9·51	25	-	5	1	2	-	2	2	2	1	1	-	-	10	-	-	1	1	1	-
August	4,832	431	9·00	17	-	-	-	-	2	3	2	-	-	2	5	1	1	-	1	-	-	-	-
September	4,395	494	11·25	19	-	-	1	-	3	-	6	1	1	-	-	1	2	1	2	1	-	-	-
October	4,390	502	11·45	23	-	1	-	1	2	-	4	2	-	4	1	1	-	1	1	1	1	4	-
November	5,761	457	7·94	24	-	-	-	3	2	2	6	-	3	4	2	-	-	-	1	1	1	1	-
December	5,446	379	7·00	14	-	-	-	-	-	-	5	1	2	1	-	-	1	-	1	-	2	-	-
						9	4	8	11	17	32	6	13	15	8	2	21	4	8	2	12	1	
						Died per 1,000 of Average Strength.																	
						2·30	1·02	2·03	2·80	4·33	8·15	1·52	3·31	3·82	2·03	·51	5·35	1·02	2·03	·51	3·05	·25	
						3,927	331	8·43	173	44·05													
DISEASES.	NUMBER OF ADMISSIONS INTO HOSPITAL IN EACH MONTH.												Total Admissions during the Year.	Admitted per Cent. of Average Strength.	Died per Cent. of Admissions.								
	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.											
	Cholera	-	-	-	1	2	2	26	4	2	3	-				-	40	1·02	22·50				
	Small-pox	-	6	6	9	4	1	3	-	-	-	-				-	29	·74	14·00				
Intermittent fevers	121	105	127	157	343	378	363	326	394	722	560	383	3,979	153·65	·59								
Remittent fevers	-	-	-	9	9	4	9	140	286	385	182	33	1,057										
Continued fevers	1	1	82	87	113	112	236	73	96	66	105	26	998	10·60	9·05								
Dysentery, acute	3	2	10	10	25	23	29	64	63	50	60	31	370										
Dysentery, chronic	-	1	2	1	2	2	3	3	9	5	10	12	50	21·11	1·56								
Diarrhoea	4	22	43	39	80	61	112	145	118	65	84	56	829										
Hepatitis, acute	3	3	8	8	20	10	8	19	18	26	20	16	159	6·14	9·54								
Hepatitis, chronic	-	4	3	4	10	8	8	4	8	7	10	16	82										
Phthisis	3	7	41	20	43	29	16	51	28	28	30	26	322	8·20	-								
Rheumatism	7	7	14	8	18	12	30	21	22	25	24	23	211										
General diseases	35	63	104	86	169	129	92	110	90	80	131	110	1,199	30·53	-								
Phthisis pulmonalis	-	-	-	-	-	2	2	4	2	2	-	2	14										
Heat apoplexy	-	-	-	2	7	9	17	8	3	1	-	1	48	1·22	43·75								
Delirium tremens	-	1	-	-	2	2	6	3	5	3	3	3	28										
Epilepsy	2	-	-	2	3	1	5	-	2	2	1	5	23	·58	-								
Respiratory diseases	3	8	38	36	48	30	35	23	20	27	72	64	404										
Abscess and ulcer	7	14	55	29	44	38	75	34	29	39	30	45	439	11·18	1·98								
Wounds and accidents	14	13	21	18	32	10	17	18	14	15	29	28	229										
All other diseases	11	24	42	59	66	61	122	76	41	48	61	70	681	17·34	-								
													11,191										
Admitted per Cent. of Average Strength in each Month.																							
17·51	15·45	21·66	18·63	22·80	20·50	28·26	22·85	28·44	36·42	24·51	17·44	285·00											

EUROPEAN TROOPS, 1859—continued.

TABLE showing the SICKNESS and MORTALITY among the EUROPEAN TROOPS serving in the Punjab, during the Year 1859, and the Prevalence of the principal Diseases in each Month of the Year.

MONTHS.	Average Strength.	Average Number Daily Sick.	Daily Sick per Cent. of Average Strength.	Number of Deaths.	Died per 1,000 of Average Strength.	CAUSES OF DEATH.																
						Cholera.	Small-pox.	Intermittent Fevers.	Remittent Fevers.	Continued Fevers.	Dysentery, Acute.	Dysentery, Chronic.	Diarrhoea.	Hepatitis, Acute.	Hepatitis, Chronic.	Phthisis Pulmonalis.	Heat Apoplexy.	Delirium Tremens.	Respiratory Diseases.	Heart Diseases.	Other Diseases.	Wounds and Accidents.
January	12,912	684	5.30	21	-	-	6	1	1	1	2	1	2	2	2	2	-	-	-	1	-	-
February	12,333	740	6.00	9	-	-	-	-	-	3	-	1	-	-	1	2	-	-	-	-	1	-
March	13,527	721	5.33	15	-	-	2	2	1	1	2	1	-	1	-	3	1	1	-	-	-	-
April	17,573	1,112	6.33	23	-	-	-	2	1	2	4	-	2	-	4	3	2	1	2	-	-	-
May	18,079	1,377	7.62	35	-	-	-	3	2	6	5	1	2	1	1	6	-	-	1	2	5	1
June	18,502	1,564	8.45	82	-	-	-	3	2	6	6	3	1	2	2	4	48	-	1	-	4	-
July	18,449	1,345	7.29	43	-	-	-	2	3	2	5	-	1	3	2	5	10	1	-	2	7	-
August	17,031	1,307	7.67	26	-	-	-	-	1	3	5	1	1	6	2	1	3	-	-	1	3	-
September	16,353	1,082	6.62	24	-	-	-	-	1	2	2	2	3	5	3	2	-	2	-	-	2	-
October	15,614	947	6.07	13	-	-	-	2	1	2	2	-	-	1	2	1	-	-	1	-	1	-
November	15,691	864	5.51	18	-	-	-	1	-	-	1	-	1	2	2	2	-	-	-	2	-	-
December	15,938	813	5.10	14	-	-	-	1	-	2	3	-	-	-	-	2	-	1	5	-	-	-
						-	8	17	12	30	37	10	13	24	22	32	64	6	9	8	30	1
						Died per 1,000 of Average Strength.																
						-	.50	1.06	.75	1.87	2.31	.62	.81	1.50	1.37	2.00	4.00	.37	.56	.50	1.87	.06

DISEASES.	NUMBER OF ADMISSIONS INTO HOSPITAL IN EACH MONTH.												Total Admissions during the Year.	Admitted per Cent. of Average Strength.	Died per Cent. of Admissions.															
	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.																		
Cholera - - - -	1	2	3	-	3	1	1	1	-	-	-	-	12	.07	.00															
Small-pox - - - -	19	7	7	6	1	3	-	-	-	-	1	-	44	.27	18.18															
Intermittent fevers - - - -	240	179	216	650	604	591	578	428	326	493	529	276	5,110	64.58	.57															
Remittent fevers - - - -	9	16	35	66	104	127	93	40	46	22	14	3	573																	
Continued fevers - - - -	44	70	122	544	1,036	1,107	628	496	235	196	136	37	4,651																	
Dysentery, acute - - - -	25	29	40	51	95	40	60	48	33	32	22	27	502	3.97	7.41															
Dysentery, chronic - - - -	6	5	15	13	20	12	12	11	9	8	13	8	132																	
Diarrhœa - - - -	106	88	110	154	177	162	198	214	150	113	91	98	1,661																	
Hepatitis, acute - - - -	20	33	35	24	40	48	38	49	35	33	21	24	400	4.58	6.28															
Hepatitis, chronic - - - -	15	9	21	20	59	38	51	44	32	23	14	7	333																	
Ophthalmia - - - -	46	51	70	81	95	85	62	62	44	44	58	43	741																	
Rheumatism - - - -	128	117	162	130	144	151	158	151	135	132	112	116	1,636	10.22	-															
Venereal diseases - - - -	321	311	391	473	486	332	405	352	294	281	350	339	4,335	27.09	-															
Phthisis pulmonalis - - - -	2	6	7	17	16	6	4	11	8	1	1	3	82	.51	40.00															
Heat apoplexy - - - -	1	1	2	4	5	82	18	6	1	-	-	-	120	.75	53.33															
Delirium tremens - - - -	2	2	6	7	6	7	11	4	12	9	10	8	84	.52	7.14															
Epilepsy - - - -	7	6	1	5	8	10	12	15	10	9	10	7	100	.62	-															
Respiratory diseases - - - -	109	123	145	99	133	103	109	105	96	109	153	101	1,385	8.65	.65															
Abscess and ulcer - - - -	111	123	127	167	168	235	203	211	169	146	116	94	1,870	11.05	-															
Wounds and accidents - - - -	147	152	208	155	157	160	112	101	112	155	163	142	1,764	11.02	-															
All other diseases - - - -	133	153	220	250	258	369	386	330	273	191	171	194	2,928	18.23	-															
													1,492	1,483	1,943	2,916	3,615	3,669	3,139	2,679	2,020	1,997	1,985	1,527	28,465					
Admitted per Cent of Average Strength in each Month.																														
																11.55	12.07	14.37	16.60	20.00	19.83	17.02	15.73	12.35	12.79	12.65	9.58	177.23		

COMPARATIVE STATEMENT of the Ratios of SICKNESS and MORTALITY among the EUROPEAN Troops serving in the various Provinces of the Bengal Presidency during the Year 1859.

DISEASES.	BENGAL PROPER.			DINAPORE, BENARES, AND OUDE.			CAWNPORE AND MEERUT.			AGRA AND CENTRAL INDIA.			PUNJAB.			BENGAL PRESIDENCY.		
	Average Strength.	Daily Sick per Cent. of Strength.	Admitted per Cent. of Strength.	Average Strength.	Daily Sick per Cent. of Strength.	Admitted per Cent. of Strength.	Average Strength.	Daily Sick per Cent. of Strength.	Admitted per Cent. of Strength.	Average Strength.	Daily Sick per Cent. of Strength.	Admitted per Cent. of Strength.	Average Strength.	Daily Sick per Cent. of Strength.	Admitted per Cent. of Strength.	Average Strength.	Daily Sick per Cent. of Strength.	Admitted per Cent. of Strength.
	5,747	17,485	11,941	3,927	16,004	9,54	11,941	17,485	11,941	3,927	16,004	9,54	11,941	17,485	11,941	3,927	16,004	9,54
	6-91	10-92	9-54	8-43	6-54	239-03	9-54	10-92	9-54	8-43	6-54	239-03	9-54	10-92	9-54	8-43	6-54	239-03
	181-25	239-03	240-00	285-00	177-23	230-00	240-00	285-00	230-00	177-23	230-00	240-00	285-00	177-23	230-00	240-00	285-00	177-23
	Died per 1,000 of Strength:	Died per 1,000 of Strength:	Died per 1,000 of Strength:	Died per 1,000 of Strength:	Died per 1,000 of Strength:	Died per 1,000 of Strength:	Died per 1,000 of Strength:	Died per 1,000 of Strength:	Died per 1,000 of Strength:	Died per 1,000 of Strength:	Died per 1,000 of Strength:	Died per 1,000 of Strength:	Died per 1,000 of Strength:	Died per 1,000 of Strength:	Died per 1,000 of Strength:	Died per 1,000 of Strength:	Died per 1,000 of Strength:	Died per 1,000 of Strength:
	A. From Cholera - 23-43	A. From Cholera - 5-55	A. From Cholera - 19-43	A. From Cholera - 2-30	A. From Cholera - 2-30	A. From Cholera - 19-43	A. From Cholera - 2-30	A. From Cholera - 2-30	A. From Cholera - 2-30	A. From Cholera - 2-30	A. From Cholera - 2-30	A. From Cholera - 2-30	A. From Cholera - 2-30	A. From Cholera - 2-30	A. From Cholera - 2-30	A. From Cholera - 2-30	A. From Cholera - 2-30	A. From Cholera - 2-30
	B. From all Causes - 50-98	B. From all Causes - 50-21	B. From all Causes - 57-78	B. From all Causes - 44-05	B. From all Causes - 44-05	B. From all Causes - 57-78	B. From all Causes - 44-05	B. From all Causes - 44-05	B. From all Causes - 44-05	B. From all Causes - 44-05	B. From all Causes - 44-05	B. From all Causes - 44-05	B. From all Causes - 44-05	B. From all Causes - 44-05	B. From all Causes - 44-05	B. From all Causes - 44-05	B. From all Causes - 44-05	B. From all Causes - 44-05
	Admitted per Cent. of Average Strength.	Died per Cent. of Average Strength.	Admitted per Cent. of Average Strength.	Died per Cent. of Average Strength.	Admitted per Cent. of Average Strength.	Died per Cent. of Average Strength.	Admitted per Cent. of Average Strength.	Died per Cent. of Average Strength.	Admitted per Cent. of Average Strength.	Died per Cent. of Average Strength.	Admitted per Cent. of Average Strength.	Died per Cent. of Average Strength.	Admitted per Cent. of Average Strength.	Died per Cent. of Average Strength.	Admitted per Cent. of Average Strength.	Died per Cent. of Average Strength.	Admitted per Cent. of Average Strength.	Died per Cent. of Average Strength.
	missions.	missions.	missions.	missions.	missions.	missions.	missions.	missions.	missions.	missions.	missions.	missions.	missions.	missions.	missions.	missions.	missions.	missions.
Cholera	4-35	54-00	23-49	1-12	49-24	5-55	3-46	56-17	19-43	1-02	22-50	2-30	0-07	18-18	5-50	1-68	50-17	8-07
Small-pox	0-3	-	18	0-9	6-00	0-5	24	13-80	83	74	14-00	1-02	27	18-18	50	22	14-75	32
Fevers	60-83	88	5-39	80-00	1-06	8-52	80-43	82	6-61	153-65	59	9-16	64-58	57	3-68	79-21	83	6-58
Dysentery	9-79	9-95	9-74	18-13	9-30	16-87	12-80	7-13	9-13	10-69	9-05	9-67	3-97	7-41	2-93	11-87	8-60	10-20
Diarrhoea	17-66	2-16	3-83	17-57	1-46	2-57	17-75	1-70	3-01	21-11	1-56	3-31	10-38	80	81	15-91	1-50	2-38
Hepatitis	3-19	4-86	1-57	7-84	8-83	6-92	8-21	5-81	4-77	6-14	9-54	5-85	4-58	6-28	2-87	6-70	7-25	4-86
Ophthalmia	5-00	-	-	12-49	-	-	8-88	-	-	8-20	-	-	4-63	-	-	8-52	-	-
Rheumatism	6-12	-	-	7-11	-	-	7-58	-	-	5-37	-	-	10-22	-	-	8-11	-	-
Veneral diseases	27-31	-	-	46-73	-	-	35-66	-	-	30-53	-	-	27-09	-	-	35-90	-	-
Phthisis pulmonalis	50	17-24	87	65	24-35	1-60	61	27-40	1-67	35	14-30	5-1	5-1	40-00	2-00	67	26-55	1-78
Heat apoplexy	22	46-15	1-04	75	37-40	2-80	1-28	56-21	7-20	1-22	43-75	5-35	75	53-33	4-00	87	47-28	4-10
Delirium tremens	2-43	4-28	1-04	73	8-53	63	90	9-26	83	71	14-30	1-02	52	7-14	37	92	7-46	69
Epilepsy	64	-	-	47	-	-	58	-	-	58	-	-	62	-	-	59	-	-
Respiratory diseases	8-00	1-08	87	675	1-70	1-15	8-07	72	58	10-29	1-98	2-03	8-65	65	56	8-05	1-14	92
Abscess and ulcer	12-85	-	-	12-53	-	-	15-69	-	-	11-18	-	-	11-05	-	-	13-02	-	-
Wounds and accidents	7-74	-	-	7-21	-	-	13-29	-	-	5-83	-	-	11-02	-	-	9-94	-	-
All other diseases	21-54	96	2-96	18-81	34	3-55	24-02	89	4-18	17-34	48	3-81	18-23	30	2-43	20-67	35	3-44
	188-25	-	50-98	239-03	-	50-21	240-00	-	57-78	285-00	-	44-05	177-23	-	20-18	222-85	-	43-97

EUROPEAN TROOPS, 1859—continued.

TABLE showing the GENERAL STATISTICS OF SICKNESS and MORTALITY in the PRINCIPAL MILITARY STATIONS of the Bengal Presidency.

STATIONS.	Period of Observation.	Average Strength during Period of Observation.	DAILY SICK PER CENT. OF AVERAGE STRENGTH IN EACH MONTH.										Number of Admissions into Hospital.	Admitted per Cent. of Average Strength.	NUMBER OF DEATHS.			DIED PER 1,000 OF AVERAGE STRENGTH.		
			Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.						
																		A. Cho-lera.	B. All other Causes.	C. All Causes.
Fort William	-	1,311	540	386	559	614	690	707	676	646	692	594	1057	633	2,151	164.07	9	25	19.07	25.94
Dum-Dum	-	1,611	420	499	499	611	565	873	1539	1204	521	863	731	613	3,601	223.62	77	60	37.24	85.04
Barrackpore	-	1,428	525	531	817	342	896	951	885	876	521	673	472	315	2,645	185.22	36	28	19.61	44.92
Barrackpore	-	466	461	961	592	898	891	632	439	419	623	672	1037	574	887	190.34	8	20	17.17	40.09
Hazarebaugh	-	370	390	506	333	839	1206	1212	1220	1159	437	1074	1215	824	1,220	329.73	1	12	27.0	35.13
Dinapore	-	1,518	805	920	1282	1017	1003	1313	1194	1327	1385	1624	1330	1262	3,835	259.22	8	87	57.31	62.58
Ghazepore	-	790	1264	1713	1371	1380	1505	1137	934	1367	1416	1716	1796	1714	2,015	253.07	9	32	11.39	51.19
Benares *	-	1,315	821	849	613	956	1026	1003	1319	1235	1409	1507	1402	1357	3,533	268.67	26	69	19.77	72.34
Azimgurh	-	427	1184	2083	1620	1197	1502	1270	1283	1354	1354	1504	2493	1032	1,171	274.24	4	8	9.37	28.11
Goruckpore	-	670	941	939	979	1219	1002	1139	1139	1395	1314	1373	651	951	1,477	220.45	30	43	-	44.78
Gondah	-	919	631	520	532	862	988	949	824	762	700	565	401	433	1,899	174.00	3	43	-	46.79
Fyzabad	-	1,342	1195	1159	944	989	521	923	1219	968	949	914	713	624	2,617	195.00	8	72	2.23	53.05
Sultanpore	-	665	493	632	643	738	758	1001	1004	1104	986	1179	1036	1179	1,417	212.76	1	10	-	15.01
Roy Bareilly	-	1,011	1040	936	1000	1374	1081	1062	824	762	837	1026	910	781	2,237	221.27	1	39	1.00	38.57
Seetapore	-	947	396	860	1057	1284	1385	998	1061	1000	809	933	762	529	1,914	202.11	28	28	-	29.57
Lucknow *	-	2,320	428	817	956	794	816	917	1287	1404	1391	1351	1209	975	8,427	253.70	42	119	12.65	35.85
Allahabad *	-	2,504	462	500	918	1486	1131	888	782	654	644	826	834	689	6,647	265.43	129	135	51.52	53.91
Cawnpore	-	1,372	614	895	829	1000	925	941	1114	1701	1012	1014	1328	782	4,127	300.08	54	81	39.36	59.04
Futtehghurh	-	808	844	781	970	1046	806	725	791	805	760	842	772	982	1,553	192.20	12	14	-	14.85
Bareilly	-	823	576	692	630	756	684	612	563	654	627	692	594	866	1,166	141.67	1	12	1.21	17.01
Moradabad	-	440	396	215	356	225	334	724	708	766	607	625	508	415	382	86.82	10	10	-	22.72
Shahjehanpore	-	688	485	456	848	502	915	806	846	746	600	637	486	574	780	113.37	1	14	1.45	20.35
Meerut	-	2,146	1101	690	1126	1040	1042	1054	1086	1015	899	714	807	825	5,423	252.70	-	50	-	23.30
Muttra	-	405	165	435	670	894	1054	1130	890	948	966	648	610	531	815	201.23	-	6	-	14.81
Delhi	-	1,400	535	629	814	939	1318	1176	1012	1012	1007	885	860	838	3,149	224.92	-	38	-	27.14
Agra	-	1,293	721	464	593	793	773	922	1313	920	1199	1185	650	755	3,249	251.27	-	33	-	25.52
Gwalior and Morar	-	1,108	608	328	456	527	707	742	932	700	782	855	641	500	3,033	253.17	-	43	-	35.89
Unbala	-	1,581	469	757	814	789	897	813	767	753	777	733	648	513	2,624	165.97	-	23	-	14.54
Dughaie	-	566	-	-	-	898	842	847	1019	1389	957	821	-	-	991	145.77	-	12	-	21.20
Subathoo	-	938	-	-	-	514	550	626	698	811	835	706	387	-	673	62.37	-	11	-	11.20
Jullundur	-	934	501	538	566	648	994	959	940	794	681	712	512	488	1,629	174.41	-	10	-	10.70
Ferozepore	-	1,070	405	675	317	544	885	731	711	733	692	442	326	351	1,345	125.70	-	15	-	14.02
Meen Meer	-	2,044	480	598	534	772	928	1106	855	1163	744	700	701	555	4,816	235.61	-	79	-	38.65
Umrutur	-	407	654	738	658	687	790	1005	1003	775	775	440	227	361	374	91.89	-	14	-	34.40
Mooltan	-	1,030	-	-	464	683	703	1050	686	515	432	456	368	404	2,063	194.76	-	20	-	19.42
Dera Ismael Khan	-	221	796	700	675	388	267	233	403	325	525	92	717	520	322	145.70	-	9	-	40.81
Seakote	-	1,600	435	670	600	600	690	826	643	715	807	756	614	594	2,051	198.19	-	17	-	10.62
Jhelum	-	532	-	-	523	715	747	626	618	618	539	-	-	-	509	95.67	-	12	-	22.55
Rawal Pindce	-	1,467	676	514	586	632	617	519	509	386	407	407	292	320	1,980	134.97	-	11	-	7.50
Attock	-	1,199	264	307	342	536	717	1195	775	287	433	-	-	-	329	165.83	-	7	-	35.18
Nowshera	-	771	-	-	340	475	541	550	632	403	374	1253	1774	-	1,183	147.00	-	11	-	14.26
Campbellpore	-	347	272	275	343	681	-	1008	709	1198	632	644	365	541	481	138.61	-	3	-	8.64
Peshawar	-	2,640	608	591	484	568	790	829	621	693	665	595	502	490	5,374	203.56	-	40	-	15.15

* Exclusive of General and Field Hospitals.

EUROPEAN TROOPS, 1859—continued.

TABLE showing the Ratio in which the PRINCIPAL DISEASES have contributed to make up the ADMISSION RATE of the Year, in the CHIEF MILITARY STATIONS of the *Bengal* Presidency.

STATIONS.	ADMITTED INTO HOSPITAL PER CENT. OF AVERAGE STRENGTH.												Admitted per Cent. of Average Strength from all Causes.
	Average Strength.	Cholera.	Heat Apoplexy.	Fevers.	Dysentery.	Diarrhea.	Hepatitis.	Ophthalmia.	Rheumatism.	Veneral Diseases.	Diseases of the Respiratory Organs.	All other Causes.	
Fort William - -	1,311	1·07	·30	56·98	7·25	15·48	3·20	6·41	4·35	33·79	6·94	28·30	164·07
Am-Dum - -	1,611	8·07	·19	74·55	12·48	20·05	2·79	4·90	5·77	26·01	7·45	61·26	223·52
Arrackpore - -	1,428	5·53	·13	66·81	6·51	16·88	2·80	4·97	7·70	21·85	8·27	43·77	185·22
Arrackpore - -	466	3·22	·64	28·33	11·80	35·19	4·72	2·36	4·93	12·88	17·17	69·10	190·34
Bazareebaugh - -	370	1·62	-	108·65	13·79	28·92	2·70	10·00	15·14	68·11	9·19	71·62	329·73
Banapore - -	1,518	1·98	·33	70·81	29·78	16·34	15·94	5·20	8·82	60·47	7·44	42·09	259·22
Bazareepore - -	790	1·65	-	125·06	16·08	11·01	2·66	3·04	6·58	57·85	3·67	27·47	255·07
Banars - -	1,315	3·50	2·81	109·28	11·10	21·22	6·69	7·60	6·92	45·86	9·51	44·18	268·07
Bimghur - -	427	1·64	·47	88·29	10·54	14·28	2·81	5·38	7·03	107·03	4·92	31·85	274·24
Arrackpore* - -	670	-	·45	59·55	42·54	4·18	12·54	11·34	3·43	48·66	5·52	32·24	220·45
Bondah - -	919	·11	·65	42·22	14·69	24·70	3·92	21·65	6·96	13·60	5·55	40·00	174·00
Bazabad - -	1,342	·30	·75	76·45	17·21	11·85	5·22	14·75	7·75	16·09	6·11	38·52	195·00
Bhatnagar - -	666	-	·15	117·27	4·80	10·66	3·60	10·36	1·05	22·52	5·56	36·79	212·76
Bhary Bareilly - -	1,011	·20	·69	102·08	4·55	16·62	3·76	15·63	6·82	32·74	8·31	29·87	221·27
Bucknow - -	3,320	2·08	·90	82·89	18·10	22·26	8·61	15·51	5·27	51·09	4·55	42·35	253·70
Betapore - -	947	·32	·21	61·88	17·53	13·62	9·93	17·63	5·17	33·89	6·65	35·28	202·11
Bahabad - -	2,504	9·50	2·32	139·54	14·09	22·92	6·47	6·19	3·43	16·25	4·96	39·78	265·45
Banpore - -	1,372	4·74	3·28	100·22	22·45	27·26	9·62	11·37	8·01	51·18	6·41	55·54	300·08
Bhatnagar - -	808	·12	·77	66·09	6·19	8·41	5·44	5·44	8·17	40·22	8·64	43·41	192·20
Bahjehanpore - -	688	·15	·15	18·17	4·94	6·39	4·94	14·68	2·62	29·94	4·86	27·03	113·37
Bareilly - -	823	·12	-	33·17	10·21	8·62	3·52	3·89	3·64	38·76	4·62	35·12	141·67
Bahabad - -	440	-	·45	28·63	5·68	4·55	2·96	6·82	·91	22·73	1·59	12·50	86·82
Berut - -	2,146	·05	·70	56·43	11·69	22·46	12·02	5·27	12·30	34·81	13·51	83·46	252·70
Bhithi - -	1,400	·21	·64	66·57	6·79	10·43	4·14	10·00	9·07	53·93	8·00	55·14	224·92
Bhatnagar - -	405	-	·74	72·34	3·46	12·84	6·42	9·14	6·91	30·37	6·42	52·59	201·23
Bahra - -	1,293	·39	1·78	115·39	7·42	15·24	5·95	12·14	5·80	37·06	17·25	32·25	251·27
Ballor and Morar - -	1,198	-	1·17	140·32	9·18	16·03	5·76	4·01	3·42	25·46	3·75	44·07	253·17
Bahalla - -	1,581	·12	·76	46·55	3·66	12·79	3·61	3·66	16·39	31·12	7·34	39·97	165·97
Bhaghaie (7 months) -	566	·35	·18	23·14	4·24	10·42	1·78	1·24	16·43	30·57	6·01	51·41	145·77
Bathoo (8 months) -	938	-	·11	10·87	2·24	3·31	1·49	3·73	1·71	17·48	1·49	19·94	63·37
Bundur - -	934	-	·43	50·96	2·14	12·31	6·00	3·00	8·03	30·73	10·71	50·10	174·41
Bazareepore - -	1,070	-	·75	36·82	3·08	3·18	1·31	2·71	13·92	28·51	4·39	31·03	125·70
Ban Meer - -	2,044	·05	1·86	96·92	3·72	12·13	4·71	8·46	7·19	40·46	7·22	52·79	235·61
Brisur - -	407	·25	·25	41·77	2·95	2·70	3·68	8·84	·25	21·87	1·95	7·37	91·89
Bolitan (10 months) -	1,030	·10	1·55	125·53	3·40	5·05	1·75	3·20	2·91	13·01	6·51	31·75	194·76
Balkote - -	1,600	-	·25	24·37	1·25	6·50	2·38	5·94	14·81	28·00	10·81	33·88	128·10
Bawal Pindee - -	1,467	·07	·20	38·11	3·82	9·81	4·50	2·86	12·89	19·15	12·00	31·56	134·97
Bawshera (9 months) -	771	·13	·92	89·75	1·69	12·97	1·95	2·34	4·02	11·15	4·54	17·54	147·00
Bhawur - -	2,640	-	·46	85·64	5·00	13·22	5·79	3·45	6·93	21·25	12·24	49·58	203·56

* The ratio for dysentery is the equivalent of 285 admissions recorded during the year.

EUROPEAN TROOPS, 1859—continued.

TABLE showing the PREVALENCE of SMALL-POX in each Month, and the Distribution of the DISEASE by STATIONS and PROVINCES.

STATIONS.	Average Strength for the Period of Occupation.	NUMBER OF ADMISSIONS INTO HOSPITAL IN EACH MONTH.												TOTAL Admissions.	Admitted per Cent. of Average Strength.	Number of Deaths.	Died per 1,000 of Average Strength.
		Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.				
Presidency hospitals - - -	- -	-	1	-	-	-	-	-	-	-	-	-	-	1	-	-	-
Fort William - - - -	1,311	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dum-Dum - - - -	1,611	-	-	-	-	2	-	-	-	-	-	-	-	2	-	1	-
Barrackpore - - - -	1,428	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chinsurah depôt - - -	425	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Raneegunge depôt - - -	506	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Berhampore - - - -	466	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	5,747	-	-	-	-	2	-	-	-	-	-	-	-	2	·03	1	·18
Darjeeling depôt (9 months) -	108	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hazareebaugh - - - -	370	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dinapore - - - -	1,518	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Shahabad district - - -	815	-	-	-	-	-	1	-	-	-	-	-	-	1	-	-	-
Sasseram - - - -	350	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ghazee pore - - - -	790	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benares hospitals - - -	95	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benares - - - -	1,315	-	-	-	2	-	-	-	-	-	-	-	-	2	-	-	-
Azimghur - - - -	427	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Goruckpore - - - -	670	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Goruckpore district - - -	930	-	-	-	-	-	1	1	-	-	-	-	-	2	-	-	-
Oude district - - - -	1,905	2	-	1	-	-	-	-	-	-	-	-	-	3	-	-	-
Gondah - - - -	919	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Fyzabad - - - -	1,342	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sultanpore - - - -	666	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Rae Bareilly - - - -	1,011	1	-	-	1	-	-	-	-	-	-	-	-	2	-	-	-
Seetapore - - - -	947	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Lucknow - - - -	3,320	3	1	3	-	-	-	-	-	-	-	-	-	7	-	1	-
	17,485	6	1	4	3	-	2	1	-	-	-	-	-	17	·09	1	·05
Allahabad - - - -	2,504	-	-	1	6	-	-	-	-	-	-	-	-	9	-	1	-
Cawnpore - - - -	1,372	1	2	-	3	2	-	-	-	-	-	-	2	8	-	-	-
Allahabad and Cawnpore general hospitals - - - -	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Futtehgurh - - - -	808	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Calpee, Oraie, and other detachment stations - - -	737	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bareilly - - - -	823	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Moradabad - - - -	440	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Shahjehanpore - - - -	688	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Meerut - - - -	2,146	-	-	1	-	-	-	-	-	-	-	-	-	1	-	1	-
Allyghur - - - -	216	-	-	-	-	1	-	-	-	-	-	-	-	1	-	1	-
Muttra - - - -	405	-	1	1	-	2	1	-	-	-	-	-	1	6	-	-	-
Delhi - - - -	1,400	2	-	-	-	2	-	-	-	-	-	-	-	4	-	2	-
Roorkee - - - -	37	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Landour depôt (8 months) -	106	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Nyneee Tal depôt (10 months) -	332	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	11,941	3	3	3	9	7	1	-	-	-	-	-	3	29	·24	4	·33
Banda district - - - -	838	-	-	-	1	-	-	-	-	-	-	-	-	1	-	-	-
Agra - - - -	1,293	-	3	6	4	4	1	2	-	-	-	-	-	20	-	-	-
Gwalior and Morar - - -	1,198	-	3	-	4	-	-	1	-	-	-	-	-	8	-	2	-
Gwalior district - - - -	598	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	3,927	-	6	6	9	4	1	3	-	-	-	-	-	29	·74	4	1·02
Umballa - - - -	1,581	-	-	-	-	-	1	-	-	-	-	-	-	1	-	-	-
Dugshaie (7 months) - - -	566	-	-	-	-	-	1	-	-	-	-	-	-	1	-	-	-
Subathoo (8 months) - - -	938	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Kussowlie depôt (8 months) -	202	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Phillour - - - -	139	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Jullundur - - - -	934	-	-	-	-	-	-	-	-	-	-	1	-	1	-	-	-
Ferozepore - - - -	1,070	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Meean Meer - - - -	2,044	7	3	5	4	1	-	-	-	-	-	-	-	20	-	3	-
Lahore citadel - - - -	170	-	-	-	-	-	1	-	-	-	-	-	-	1	-	-	-
Umritsur - - - -	407	1	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-
Govindghur - - - -	102	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Mooltan (10 months) - - -	1,030	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dera Ismael Khan - - -	221	-	2	-	-	-	-	-	-	-	-	-	-	2	-	-	-
Kangra - - - -	83	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sealkote - - - -	1,600	-	1	-	1	-	-	-	-	-	-	-	-	2	-	-	-
Jhelum (6 months) - - -	532	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Rawul Pindee - - - -	1,467	-	-	-	1	-	-	-	-	-	-	-	-	1	-	-	-
Attock (9 months) - - -	199	1	-	-	-	-	-	-	-	-	-	-	-	1	-	1	-
Nowshera (9 months) - - -	771	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Campbellpore - - - -	347	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Peshawur - - - -	2,640	10	1	2	-	-	-	-	-	-	-	-	-	13	-	4	-
Murree depôt (6 months) - -	270	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	16,004	19	7	7	6	1	3	-	-	-	-	1	-	44	·27	8	·50
BENGAL PRESIDENCY - - -	55,104	28	18	20	27	14	7	4	-	-	-	1	3	122	·22	18	·32

EUROPEAN TROOPS, 1859—continued.

TABLE showing the PREVALENCE of CHOLERA in each Month, and the Distribution of the DISEASE by STATIONS and PROVINCES.

STATIONS.	Average Strength for the Period of Occupation.	NUMBER OF ADMISSIONS INTO HOSPITAL IN EACH MONTH.												Total Admissions.	Admitted per Cent. of Average Strength.	Number of Deaths.	Died per 1,000 of Average Strength.
		Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.				
Presidency hospitals - - -	-	1	1	-	1	2	-	1	5	-	-	-	1	12	-	5	-
Fort William - - - -	1,311	1	-	-	2	5	1	-	2	2	-	-	1	14	-	9	-
Dum-Dum - - - -	1,611	-	-	-	-	1	2	-	113	1	13	-	-	130	-	77	-
Barrackpore - - - -	1,428	-	1	8	1	-	2	4	50	2	10	1	-	79	-	36	-
Chinsurah depôt - - -	425	1	-	-	-	1	1	-	-	4	2	-	-	9	-	3	-
Raneegunge depôt - - -	506	2	-	-	-	-	-	-	1	-	-	-	-	3	-	2	-
Berhampore - - - -	466	-	-	10	3	-	-	-	-	-	2	-	-	15	-	8	-
	5,747	4	1	18	6	7	6	4	166	9	27	1	1	250	4.35	135	23.49
Darjeeling depôt (nine months) -	108	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hazareebaugh - - - -	370	-	-	1	5	-	-	-	-	-	-	-	-	6	-	1	-
Dinapore - - - -	1,518	1	1	2	1	2	9	3	7	-	-	3	1	30	-	8	-
Shahabad district - - -	815	-	-	-	-	-	1	-	-	-	-	-	1	2	-	-	-
Sasseram - - - -	350	-	-	-	1	-	-	-	-	-	-	-	1	2	-	1	-
Ghazee pore - - - -	790	-	-	-	1	3	3	5	1	-	-	-	-	13	-	9	-
Benâres hospitals - - -	95	-	-	-	-	1	-	-	1	-	-	-	-	2	-	2	-
Benares - - - -	1,315	-	-	-	1	3	11	9	18	1	2	1	-	46	-	26	-
Azimghur - - - -	427	-	-	-	-	3	-	-	1	-	2	1	-	7	-	4	-
Goruckpore - - - -	670	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-
Goruckpore district - - -	930	-	-	1	-	1	-	-	-	-	-	-	-	2	-	-	-
Oude district - - - -	1,905	-	-	1	-	1	-	-	-	-	-	-	-	2	-	-	-
Gondah - - - -	919	-	-	-	1	-	-	-	-	-	-	-	-	1	-	-	-
Fyzabad - - - -	1,342	-	-	-	-	-	-	3	-	1	-	-	-	4	-	3	-
Sultanpore - - - -	666	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Rae Bareilly - - - -	1,011	-	-	-	1	-	-	-	-	-	1	-	-	2	-	1	-
Seetapore - - - -	947	-	-	2	-	-	-	-	1	-	-	-	-	3	-	-	-
Lucknow - - - -	3,320	-	-	1	3	-	1	3	44	22	1	-	-	75	-	42	-
	17,485	1	1	8	14	14	25	23	73	24	6	5	3	197	1.12	97	5.55
Allahabad - - - -	2,504	1	-	-	38	111	13	18	52	1	3	-	1	238	-	129	-
Cawnpore - - - -	1,372	-	-	-	-	12	1	2	44	4	2	-	-	65	-	54	-
Allahabad and Cawnpore general hospitals - - - -	-	1	1	2	7	54	6	2	24	5	-	-	1	103	-	47	-
Futtehgurh - - - -	808	-	-	-	-	-	-	-	-	1	-	-	-	1	-	-	-
Calpee, Oraie, and other detachment stations - - -	737	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bareilly - - - -	823	-	-	-	-	1	-	-	-	-	-	-	-	1	-	1	-
Moradabad - - - -	440	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Shahjehanpore - - - -	688	-	-	-	-	-	-	-	1	-	-	-	-	1	-	1	-
Meerut - - - -	2,146	-	-	-	-	-	1	-	-	-	-	-	-	1	-	-	-
Allyghur - - - -	216	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Muttra - - - -	405	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Delhi - - - -	1,400	-	1	1	-	-	-	-	-	1	-	-	-	3	-	-	-
Roorkee - - - -	37	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Landour depôt (8 months) -	106	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Nynce Tal depôt (10 months)	322	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	11,941	2	2	3	45	178	21	22	121	12	5	-	2	413	3.46	232	19.43
Banda district * - - - -	838	-	-	-	-	1	2	26	1	2	2	-	-	34	-	9	-
Agra - - - -	1,293	-	-	-	1	1	-	-	3	-	-	-	-	5	-	-	-
Gwalior and Morar - - - -	1,198	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Gwalior district - - - -	598	-	-	-	-	-	-	-	-	-	1	-	-	1	-	-	-
	3,927	-	-	-	1	2	2	26	4	2	3	-	-	40	1.02	9	2.30
Umballa - - - -	1,581	-	-	2	-	-	-	-	-	-	-	-	-	2	-	-	-
Dugshaie (7 months) - - -	566	-	-	-	-	1	-	1	-	-	-	-	-	2	-	-	-
Subathoo (8 months) - - -	938	-	1	-	-	-	-	-	-	-	-	-	-	1	-	-	-
Kussowlie depôt (8 months)	202	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Phillour - - - -	139	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Jullundur - - - -	934	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Perozepore - - - -	1,070	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Meeran Meer - - - -	2,044	1	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-
Lahore citadel - - - -	170	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Umritsur - - - -	407	-	-	-	-	1	-	-	-	-	-	-	-	1	-	-	-
Govindghur - - - -	102	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Mooltan (10 months) - - -	1,030	-	1	1	-	-	-	-	-	-	-	-	-	2	-	-	-
Dera Ismael Khan - - - -	221	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Kangra - - - -	83	-	-	-	-	1	-	-	-	-	-	-	-	1	-	-	-
Sealkote - - - -	1,600	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Jhelum (6 months) - - -	532	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Rawul Pindee - - - -	1,467	-	-	-	-	-	1	-	-	-	-	-	-	1	-	-	-
Attock (9 months) - - -	199	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Nowshera (9 months) - - -	771	-	-	-	-	-	-	-	1	-	-	-	-	1	-	-	-
Campbellpore - - - -	347	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Peshawur - - - -	2,640	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Murree depôt (6 months) -	270	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	16,004	1	2	3	-	3	1	1	1	-	-	-	-	12	0.7	-	-
BENGAL PRESIDENCY - - -	55,104	9	7	32	67	206	55	77	370	47	41	6	7	924	1.68	478	8.67

* The Banda District should have been included in the Eastern Province of the Presidency.

TABLE showing the MORTALITY in each STATION, the CAUSES of DEATH, and the Ratio of DEATHS to STRENGTH.

STATIONS.	Average Strength for the Period of Occupation.	CAUSES OF DEATHS IN HOSPITAL.																	Num-ber of Deaths.	DIED PER 1,000 OF AVERAGE STRENGTH.		
		Cholera.	Small-pox.	Intermittent Fevers.	Remittent Fevers.	Continued Fevers.	Dysentery, Acute.	Dysentery, Chronic.	Diarrhoea.	Hepatitis, Acute.	Hepatitis, Chronic.	Pulmonary.	Heat Apoplexy.	Delirium Tremens.	Respiratory Diseases.	Heart Diseases.	All other Diseases.	Wounds and Accidents.		A. Cholera.	B. Other Causes.	C. All Causes.
Presidency hospitals -	-	5	-	1	5	3	8	9	2	2	10	11	-	1	2	1	4	2	66	-	-	-
Fort William -	1,311	9	-	1	-	4	6	-	3	1	-	2	2	1	-	-	5	-	34	6.87	19.07	25.94
Dum-Dum -	1,611	77	1	1	8	5	26	5	3	3	3	1	2	-	-	1	1	137	47.80	37.24	85.04	
Barrackpore -	1,428	36	-	-	2	3	4	-	12	-	-	1	1	1	-	-	4	-	64	25.21	19.61	44.82
Chinsurah depôt -	425	3	-	-	2	1	6	-	1	-	2	-	-	1	-	-	-	1	17	-	-	-
Raneegunge depôt -	506	2	-	-	-	-	3	-	1	-	-	1	-	2	2	-	2	-	13	-	-	-
Berhampore -	466	8	-	-	1	3	5	1	2	-	-	-	1	1	3	-	3	-	28	17.17	42.92	60.09
	5,747	135	1	2	13	16	50	6	22	4	5	5	6	6	5	-	15	2	293	23.49	27.49	50.98
Darjeeling depôt (9 months)	108	-	-	-	-	-	1	-	1	1	1	-	-	-	2	-	-	-	6	-	-	-
Hazareebaugh -	370	1	-	1	1	3	1	1	1	-	-	1	1	1	2	-	-	-	13	2.70	32.43	35.13
Dinapore -	1,518	8	-	-	10	8	25	5	-	15	12	2	3	1	-	3	3	-	95	5.27	57.31	62.58
Shahabad district -	815	-	-	-	2	2	11	1	10	4	5	1	1	1	-	1	2	-	41	-	-	50.30
Sasseram -	350	1	-	1	2	-	9	2	1	-	1	1	3	-	-	-	-	21	2.86	57.14	60.00	
Ghazee-pore -	790	9	-	-	3	6	11	3	-	2	-	2	-	3	1	-	1	-	41	11.39	40.51	51.19
Benares hospital -	95	2	-	-	-	1	9	1	1	1	-	1	1	-	1	-	-	18	-	-	-	
Benares -	1,315	26	-	1	5	9	17	3	10	5	1	5	8	-	1	1	3	-	95	19.77	52.47	72.24
Azinghur -	427	4	-	-	1	-	1	2	-	-	-	1	2	-	-	-	1	-	12	9.37	18.74	28.11
Goruckpore -	670	-	-	-	2	3	15	1	-	4	1	-	-	-	-	1	3	-	30	-	-	44.78
Goruckpore district -	930	-	-	1	3	2	7	-	3	7	2	2	1	1	-	1	4	1	35	-	-	37.63
Oude district -	1,905	-	-	-	10	4	20	2	2	5	-	2	5	-	3	1	4	1	59	-	-	-
Gondah -	919	-	-	-	-	11	16	-	2	1	-	1	5	2	-	1	3	1	43	-	-	46.79
Fyzabad -	1,342	3	-	-	4	10	31	2	3	6	2	3	4	-	1	3	3	-	75	2.23	53.65	55.88
Sultanpore -	666	-	-	-	1	-	5	-	-	3	-	-	-	-	1	-	-	-	10	-	-	15.01
Rae Bareilly -	1,011	1	-	1	1	9	11	-	2	7	-	-	3	-	-	1	2	2	40	1.00	38.57	39.57
Sectapore -	947	-	-	-	3	5	7	-	1	4	2	-	-	-	3	-	2	1	28	-	-	29.57
Lucknow -	3,320	42	1	2	8	13	59	16	8	14	15	7	12	2	5	1	9	2	216	12.65	35.85	48.50
	17,485	97	1	7	56	86	256	39	45	79	42	28	49	11	20	14	40	8	878	5.55	44.66	50.21
Allahabad -	2,504	129	1	10	7	13	29	2	14	7	3	4	32	3	1	-	7	2	264	51.52	53.91	105.43
Cawnpore -	1,372	54	-	2	-	6	20	4	5	5	4	-	22	1	-	-	12	-	135	39.36	59.04	98.40
Allahabad and Cawnpore general hospitals -	-	47	-	-	11	6	5	4	5	6	4	4	5	-	-	-	7	-	104	-	-	-
Futtehgurh -	808	-	-	-	-	-	2	2	-	-	-	1	5	2	-	-	-	-	12	-	-	14.85
Calpee, Oraie, and other detachment stations -	737	-	-	-	-	-	4	-	3	-	-	1	1	-	1	1	-	1	12	-	-	16.28
Bareilly -	823	1	-	-	1	-	2	2	1	1	-	3	-	1	-	1	2	-	15	1.21	17.01	18.22
Moradabad -	440	-	-	1	1	2	1	1	1	1	-	-	2	-	-	-	-	-	10	-	-	22.72
Shahjehanpore -	688	1	-	-	1	1	-	-	-	7	4	1	-	-	-	-	-	-	15	1.45	20.35	21.80
Meerut -	2,146	-	-	1	4	3	6	2	3	4	3	4	7	-	4	1	6	2	50	-	-	23.30
Allyghur -	216	-	1	-	-	3	5	1	-	1	-	-	1	-	-	-	1	-	13	-	-	60.18
Muttra -	405	-	-	2	1	-	2	-	-	-	-	-	1	-	-	-	-	-	6	-	-	14.81
Delhi -	1,400	-	2	-	-	1	10	1	1	3	3	-	9	3	-	-	4	1	38	-	-	27.14
Roorkee -	37	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	1	-	-	-
Landour depôt (8 months)	106	-	-	-	1	-	1	-	-	-	-	1	2	-	-	-	1	-	6	-	-	-
Nynee Tall depôt (10 mths.)	332	-	-	-	-	1	1	2	3	-	-	-	-	-	1	-	1	-	9	-	-	-
	11,941	232	4	16	27	36	88	21	36	35	22	20	86	10	7	3	41	6	690	19.43	88.35	57.78
Banda district -	838	9	-	1	2	13	11	-	9	4	1	-	5	2	3	-	5	1	66	10.74	68.01	78.75
Agra -	1,293	-	2	3	2	1	6	-	1	2	3	-	8	1	2	-	2	-	33	-	-	25.52
Gwalior and Morar -	1,198	-	2	2	4	2	5	2	2	8	2	2	7	1	-	1	3	-	43	-	-	35.89
Gwalior district -	598	-	-	2	3	1	10	4	1	1	2	-	1	-	3	1	2	-	31	-	-	30.66
	3,927	9	4	8	11	17	32	6	13	15	8	2	21	4	8	2	12	1	173	2.30	41.75	44.05
Umballa -	1,581	-	-	-	3	-	3	1	1	2	1	1	4	1	-	1	5	-	23	-	-	14.54
Dugshaie (7 months)	566	-	-	1	-	-	3	2	-	1	-	3	-	-	1	-	1	-	12	-	-	21.20
Subathoo (8 months)	938	-	-	-	2	-	2	-	2	1	1	-	1	-	-	-	1	1	11	-	-	11.72
Kussowlie depôt (8 months)	202	-	-	-	-	1	-	-	-	-	2	-	-	-	-	-	2	-	5	-	-	-
Phillour -	189	-	-	-	-	-	1	-	-	1	-	-	-	-	-	-	1	-	3	-	-	11.58
Jullundur -	934	-	-	-	-	1	1	-	1	1	-	3	2	-	1	-	-	-	10	-	-	10.70
Ferozepore -	1,070	-	-	2	-	1	1	-	-	-	1	2	4	-	1	1	2	-	15	-	-	14.02
Meean Meer -	2,044	-	3	7	1	7	10	3	2	5	5	6	20	2	2	1	5	-	79	-	-	38.65
Lahore citadel -	170	-	-	-	-	-	-	1	-	2	1	-	4	-	-	-	-	-	8	-	-	47.06
Umritsur -	407	-	-	2	2	1	2	-	-	4	-	-	1	-	1	-	1	-	14	-	-	34.40
Govindghur -	102	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	1	-	-	10.00
Mooltan (10 months)	1,030	-	-	1	2	1	1	-	-	1	2	2	10	-	-	-	-	-	20	-	-	19.42
Dera Ismael Khan -	221	-	-	-	4	1	-	-	-	1	-	1	1	-	-	-	1	-	9	-	-	40.81
Kangra -	83	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	12.00
Sealkote -	1,600	-	-	-	1	2	-	-	1	1	2	1	3	-	-	2	-	4	17	-	-	10.62
Jhelum (6 months)	532	-	-	-	-	-	6	-	-	2	1	-	-	1	-	-	2	-	12	-	-	22.55
Rawul Pindie -	1,467	-	-	-	-	2	1	1	1	1	2	-	1	-	1	1	-	-	11	-	-	7.50
Attock (9 months)	199	-	1	-	-	1	1	-	-	-	-	-	3	-	-	1	-	-	7	-	-	35.18
Nowshera (9 months)	771	-	-	2	-	1	-	1	-	-	-	1	1	3	-	-	1	1	11	-	-	14.26
Campbellpore -	347	-	-	-	-	1	-	-	-	-	-	1	-	1	-	-	-	3	-	-	8.64	
Peshawur -	2,640	-	4	1	-	7	3	-	2	1	-	11	7	-	-	1	3	-	40	-	-	15.15
Murree depôt (6 months)	270	-	-	1	-	-	-	1	3	-	3	-	-	1	-	1	1	-	11	-	-	-
	16,004	-	8	17	12	30	37	10	13	24	22	32	64	6	9	8	30	1	323	-	20.18	20.18
BENGAL PRESIDENCY -	55,104	478	18	51	124	188	471	91	131	159	109	98	226	38	51	28	142	20	2,423	8.67	35.30	43.97

EUROPEAN TROOPS, 1859—continued.

TABLE showing the CAUSES of DEATH and INVALIDING.

TOTAL LOSS TO THE SERVICE BY DEATH AND INVALIDING, 3,866. PER 1,000 OF AVERAGE STRENGTH, 70.15.

NUMBER OF MEN LOST TO THE SERVICE BY DEATH, 2,490.

NUMBER OF MEN LOST TO THE SERVICE BY INVALIDING, 1,367.*

CAUSES OF DEATH.	Died in Hospital.	Died out of Hospital.	Died per 1,000 of Strength.	CAUSES OF INVALIDING.	Number Invalided.	Invalided per 1,000 of Strength.
Variola - - - - -	18	-	·32	Febris intermittens - - - - -	40	} 1·92
Tonsillitis - - - - -	1	-	-	" remittens - - - - -	34	
Febris intermittens - - - - -	51	-	·92	" continua - - - - -	32	
" remittens - - - - -	124	-	2·25	Morbi oculorum - - - - -	81	1·47
" continua - - - - -	188	-	3·41	Dysenteria - - - - -	111	2·01
Erysipelas - - - - -	5	-	-	Diarrhoea - - - - -	17	·31
Anthrax - - - - -	1	-	-	Cholera - - - - -	2	-
Phlegmon - - - - -	3	-	-	Rheumatismus - - - - -	209	3·79
Dysenteria acuta - - - - -	471	-	8·55	Lumbago - - - - -	2	-
" chronica - - - - -	91	-	1·65	Syphilis - - - - -	27	} ·71
Diarrhoea - - - - -	131	-	2·38	Orchitis - - - - -	2	
Cholera - - - - -	478	2	8·67	Stricture urethræ - - - - -	9	
Rheumatismus - - - - -	5	-	-	Rupia - - - - -	1	-
Syphilis - - - - -	7	-	-	Anasarca - - - - -	1	-
Stricture urethræ - - - - -	3	-	-	Scrofula - - - - -	16	} 1·51
Scorbutus - - - - -	1	-	-	Phthisis pulmonalis - - - - -	58	
Ebriositas - - - - -	2	1	-	Hæmoptysis - - - - -	6	
Anæmia - - - - -	1	-	-	Morbus coxæ - - - - -	3	-
Anasarca - - - - -	7	-	-	Meningitis - - - - -	1	-
Scrofula - - - - -	1	-	-	Apoplexia - - - - -	2	-
Phthisis pulmonalis - - - - -	98	-	1·78	Insolatio - - - - -	3	-
Hæmoptysis - - - - -	4	-	-	Paralysis - - - - -	14	-
Meningitis - - - - -	1	-	-	Paraplegia - - - - -	1	-
Encephalitis - - - - -	2	-	-	Delirium tremens - - - - -	1	-
Apoplexia - - - - -	226	18	4·43	Mania - - - - -	13	-
Paralysis - - - - -	2	-	-	Dementia - - - - -	21	-
Phrenitis - - - - -	8	-	-	Melancholia - - - - -	3	-
Delirium tremens - - - - -	38	-	·69	Epilepsia - - - - -	18	·33
Mania - - - - -	1	-	-	Cephalæa - - - - -	7	-
Amentia - - - - -	2	-	-	Sciatica - - - - -	1	-
Melancholia - - - - -	1	-	-	Otitis - - - - -	4	-
Epilepsia - - - - -	4	-	-	Dysœcœa - - - - -	4	-
Cephalæa - - - - -	1	-	-	Vertigo - - - - -	1	-
Tetanus - - - - -	1	-	-	Pericarditis - - - - -	1	-
Hydrophobia - - - - -	1	-	-	Morbus cordis - - - - -	57	} 1·56
Otitis - - - - -	1	-	-	Palpitatio - - - - -	24	
Pericarditis - - - - -	2	-	-	Aneurisma - - - - -	4	
Morbus cordis - - - - -	20	1	·38	Varix - - - - -	7	-
Aneurisma - - - - -	6	2	-	Angina pectoris - - - - -	1	-
Hæmorrhagia - - - - -	1	-	-	Bronchitis - - - - -	51	} 1·07
Dyspnœa - - - - -	1	-	-	Pleuritis - - - - -	2	
Laryngitis - - - - -	1	-	-	Pneumonia - - - - -	1	
Catarrhus - - - - -	12	-	-	Asthma - - - - -	3	-
Bronchitis - - - - -	12	-	·96	Dyspnœa - - - - -	2	-
Pneumonia - - - - -	19	-	-	Gastritis - - - - -	3	-
Pleuritis - - - - -	6	-	-	Hernia - - - - -	4	-
Hydrothorax - - - - -	1	-	-	Dyspepsia - - - - -	17	-
Empyema - - - - -	1	-	-	Hæmorrhœis - - - - -	3	-
Gastritis - - - - -	1	-	-	Fistula in ano - - - - -	2	-
Enteritis - - - - -	9	-	-	Splenitis - - - - -	12	-
Peritonitis - - - - -	23	-	-	Hepatitis - - - - -	186	} 3·37
Ileus - - - - -	2	-	-	Ascites - - - - -	1	
Hernia - - - - -	1	-	-	Nephritis - - - - -	4	
Dyspepsia - - - - -	3	-	-	Ischuria - - - - -	1	-
Hæmatemesis - - - - -	2	-	-	Varicocele - - - - -	1	-
Splenitis - - - - -	2	-	-	Arthritis - - - - -	1	-
Hepatitis acuta - - - - -	159	-	2·88	Ostitis - - - - -	4	-
" chronica - - - - -	109	1	1·98	Necrosis - - - - -	5	-
Icterus - - - - -	8	-	-	Contractura - - - - -	10	-
Ascites - - - - -	9	-	-	Curvature of spine - - - - -	1	-
Nephritis - - - - -	1	-	-	Phlegmon - - - - -	2	-
Albumenuria - - - - -	1	-	-	Paronychia - - - - -	1	-
Cystitis - - - - -	2	-	-	Ulcus - - - - -	13	-
Periostitis - - - - -	1	-	-	Tumor - - - - -	1	-
Necrosis - - - - -	1	-	-	Morbi cutis - - - - -	2	-
Abscessus - - - - -	3	-	-	Verrucæ - - - - -	1	-
Cachexia - - - - -	1	-	-	Cachexia - - - - -	6	-
Debilitas - - - - -	3	-	-	Debilitas (worn out) - - - - -	89	} 1·62
Accident - - - - -	-	9	-	Luxatura - - - - -	1	
Ambustio - - - - -	2	-	-	Subluxatio - - - - -	5	
Ictus fulmenis - - - - -	-	1	-	Fractura - - - - -	11	} 1·32
Submersio - - - - -	-	23	-	Contusio - - - - -	8	
Suffocatio - - - - -	-	1	-	Concussio cerebri - - - - -	2	
Fractura - - - - -	6	-	-	Vulnus clopetarium - - - - -	37	} 1·32
Contusio - - - - -	3	-	-	" incisum - - - - -	3	
Concussio cerebri - - - - -	2	-	1·13	Amputatio - - - - -	3	
Compressio cerebri - - - - -	2	-	-	Injury not specified - - - - -	3	} 3·81
Vulnus sclopetarium - - - - -	4	-	-	Causes not specified - - - - -	26	
Killed in action - - - - -	-	4	-			
Suicide - - - - -	1	4	-			
Found dead; cause of death unknown - - - - -	-	9	-			
Ratio per 1,000 for deaths from causes not specially calculated - - - - -	-	-	2·97	Ratio per 1,000 for invaliding from causes not specially calculated - - - - -	-	3·81
	2,423	76	45·35		1,367	24·80

* See Note to Table, page 80.

EUROPEAN TROOPS, 1860.

TABLE showing the SICKNESS and MORTALITY among the EUROPEAN TROOPS serving in the Bengal Presidency during the Year 1860, and the prevalence of the principal Diseases in each Month of the Year.

MONTHS.	Average Strength.	Average Number Daily Sick.	Daily Sick per Cent. of Average Strength.	Number of Deaths.	Died per 1,000 of Average Strength.	CAUSES OF DEATHS IN HOSPITAL.																	
						Cholera.	Small-pox.	Intermittent Fevers.	Remittent Fevers.	Continued Fevers.	Dysentery, Acute.	Dysentery, Chronic.	Diarrhea.	Hepatitis, Acute.	Hepatitis, Chronic.	Phthisis Pulmonalis.	Heat Apoplexy.	Delirium Tremens.	Respiratory Diseases.	Heart Diseases.	All other Diseases.	Wounds and Accidents.	
January -	47,503	3,533	7.44	55	-	-	1	4	4	1	12	1	1	14	2	4	-	-	4	1	6	-	
February -	50,534	3,703	7.33	65	-	27	1	-	1	1	2	4	1	3	3	4	2	1	3	2	5	-	
March -	49,169	3,885	7.90	151	-	97	2	-	7	2	17	3	1	3	3	5	1	-	1	2	5	2	
April -	50,099	4,232	8.45	251	-	153	7	3	6	7	20	3	7	4	13	4	6	2	5	2	8	1	
May -	50,215	4,168	8.30	126	-	31	6	-	11	10	14	2	3	6	1	4	14	5	3	1	14	1	
June -	50,239	4,362	8.68	184	-	29	2	2	17	10	8	1	3	7	6	5	68	10	2	2	10	2	
July -	49,617	4,436	8.94	128	-	23	-	3	6	9	10	4	3	7	7	8	25	2	4	1	15	1	
August -	48,862	4,568	9.35	274	-	159	-	7	12	7	24	-	5	9	7	13	2	4	5	5	14	1	
September -	48,637	4,720	9.70	215	-	58	-	5	21	13	47	6	9	13	5	11	6	5	2	2	11	1	
October -	48,155	4,210	8.74	119	-	5	-	1	16	19	15	2	9	10	7	9	1	5	7	1	12	-	
November -	47,132	3,572	7.58	102	-	6	2	3	12	5	14	5	4	15	6	9	-	2	3	4	9	3	
December -	46,677	3,219	6.89	73	-	1	3	1	7	4	8	7	1	8	8	7	-	2	6	2	6	2	
						589	24	29	120	88	191	38	47	99	73	83	125	38	45	25	115	14	
						Died per 1,000 of Average Strength.																	
						12.04	.49	.59	2.46	1.80	3.91	.77	.96	2.02	1.50	1.70	2.56	.77	.92	.51	2.35	.29	

Deaths out of Hospital, 56. Died per 1,000 of Average Strength, 1.13.

DISEASES.	NUMBER OF ADMISSIONS INTO HOSPITAL IN EACH MONTH.												Total Admissions during the Year.	Admitted per Cent. of Average Strength.	Died per Cent. of Admissions.												
	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.															
Cholera - - - -	-	59	160	274	54	51	51	323	97	12	22	3	1,106	2.26	53.25												
Small-pox - - -	8	12	24	32	20	10	2	1	-	-	19	36	164	.34	14.63												
Intermittent fevers - -	998	679	762	1,323	1,186	1,592	1,592	1,996	2,277	2,305	1,980	1,542	18,232	72.33	.67												
Remittent fevers - -	177	122	272	528	399	661	743	509	744	809	381	136	5,481														
Continued fevers - -	261	239	628	1,541	1,635	1,874	1,625	1,318	1,193	750	371	222	11,657														
Dysentery, acute - -	121	114	201	268	230	181	223	488	546	349	215	184	3,120	7.52	6.23												
Dysentery, chronic - -	44	44	23	41	50	37	43	39	63	60	57	56	577														
Diarrhoea - - - -	319	404	601	705	536	454	550	1,167	727	423	399	378	6,663														
Hepatitis, acute - -	127	98	137	184	174	204	184	188	179	192	165	141	1,973	13.62	.70												
Hepatitis, chronic - -	66	92	91	95	115	97	121	113	102	86	76	87	1,141														
Ophthalmia - - - -	277	381	438	446	356	282	257	294	298	246	264	239	3,778														
Rheumatism - - - -	365	360	331	301	265	264	325	360	341	348	328	335	3,923	8.02	-												
Veneral diseases - -	1,645	1,606	1,734	1,463	1,494	1,322	1,179	1,233	1,125	1,168	1,220	1,289	16,478	33.80	-												
Phthisis pulmonalis -	21	18	14	17	23	25	43	25	23	24	25	48	306	.63	27.12												
Heat apoplexy - - -	1	3	3	10	31	157	66	14	11	3	1	1	301	.62	41.52												
Delirium tremens - -	29	27	33	45	52	38	37	40	23	24	23	24	395	.81	9.62												
Epilepsy - - - - -	21	24	24	29	26	27	14	33	18	29	15	14	274	.56	-												
Respiratory diseases -	400	342	350	326	354	260	270	273	233	314	441	378	3,941	8.06	1.14												
Abscess and ulcer - -	464	453	457	521	570	616	745	520	511	477	404	427	6,165	12.61	-												
Wounds and accidents -	416	389	486	372	393	307	284	290	284	335	366	470	4,392	8.98	-												
All other diseases - -	569	587	802	1,060	994	990	1,087	1,110	960	780	682	651	10,272	21.00	.34												
													6,329	6,053	7,571	9,581	8,957	9,449	9,441	10,334	9,755	8,734	7,454	6,661	100,319		
Admitted per Cent. of Average Strength in each Month.																											
													13.32	11.98	15.40	19.12	17.83	18.81	19.03	21.15	20.05	18.14	15.81	14.27	205.15		

EUROPEAN TROOPS, 1860—continued.

TABLE showing the SICKNESS and MORTALITY among the EUROPEAN TROOPS serving in *Bengal* Proper during the Year 1860, and the prevalence of the principal Diseases in each Month of the Year.

MONTHS.	Average Strength.	Average Number Daily Sick.	Daily Sick per Cent. of Average Strength.	Number of Deaths.	Died per 1,000 of Average Strength.	CAUSES OF DEATH.																				
						Cholera.	Small-pox.	Intermittent Fevers.	Remittent Fevers.	Continued Fevers.	Dysentery, Acute.	Dysentery, Chronic.	Diarrhea.	Hepatitis, Acute.	Hepatitis, Chronic.	Phthisis Pulmonalis.	Heat Apoplexy.	Delirium Tremens.	Respiratory Diseases.	Heart Diseases.	All other Diseases.	Wounds and Accidents.				
January	5,531	290	5.25	9	-	-	-	-	1	-	5	-	-	1	1	-	-	-	1	-	-	-	-			
February	5,807	332	5.72	18	-	15	-	-	-	-	5	-	1	1	-	-	-	1	-	-	1	-	-			
March	5,230	367	7.03	25	-	17	-	-	1	-	5	-	-	-	-	-	-	-	-	-	-	-	-			
April	3,676	300	8.11	15	-	6	-	1	1	-	4	1	-	-	-	1	-	-	1	-	-	-	-			
May	4,124	388	9.42	34	-	17	-	-	1	4	3	-	-	1	-	-	-	5	1	1	-	-	-			
June	4,141	448	10.83	15	-	8	-	-	1	-	3	-	-	-	-	-	-	1	2	-	-	-	1			
July	4,154	479	11.54	16	-	1	-	-	-	1	3	2	-	2	-	-	-	2	-	-	1	-	-			
August	4,000	467	11.68	11	-	-	-	2	2	-	1	-	-	3	-	-	-	-	-	-	-	-	-			
September	3,747	405	10.81	7	-	-	-	2	-	-	1	-	-	1	-	2	1	-	-	-	-	-	-			
October	4,402	322	7.32	11	-	-	-	1	-	4	3	-	-	2	-	-	-	-	1	1	-	-	-			
November	5,766	325	5.65	8	-	4	-	-	-	-	-	-	-	-	-	-	-	1	-	-	2	1	-			
December	5,053	353	7.00	12	-	1	-	-	1	3	1	1	-	1	1	-	-	-	-	-	2	-	1			
						69	-	4	10	13	34	4	1	12	2	3	10	5	4	6	2	2				
Died per 1,000 of Average Strength.																										
4,636						373	8.06	181	39.04	14.88	-	.86	2.16	2.80	7.34	.86	.22	2.59	.43	.65	2.16	1.08	.86	1.30	.43	.43

DISEASES.	NUMBER OF ADMISSIONS INTO HOSPITAL IN EACH MONTH.												Total Admissions during the Year.	Admitted per Cent. of Average Strength.	Died per Cent. of Admissions.	
	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.				
Cholera	-	25	28	13	27	14	4	2	2	1	11	2	129	2.78	53.50	
Small-pox	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Intermittent fevers	108	64	41	44	76	140	195	255	220	132	202	206	1,683	77.38	.75	
Remittent fevers	2	4	18	7	60	152	141	77	18	6	5	2	492			
Continued fevers	22	36	57	137	216	386	211	92	106	65	47	34	1,409			
Dysentery, acute	17	14	32	30	45	31	49	61	39	35	34	37	424	10.76	7.84	
Dysentery, chronic	1	-	-	3	6	5	3	5	13	3	13	9	61			
Diarrhoea	40	95	113	99	100	130	102	105	82	43	109	78	1,096			
Hepatitis, acute	11	10	10	10	14	10	9	20	17	9	8	9	137	4.61	6.54	
Hepatitis, chronic	6	6	6	5	9	6	5	5	10	7	7	7	77			
Ophthalmia	23	25	25	12	18	11	14	12	18	13	27	26	224			
Rheumatism	29	35	40	34	32	27	21	26	38	36	41	36	395			
Veneral diseases	220	188	148	130	167	85	70	71	117	106	152	139	1,593			
Phthisis pulmonalis	3	1	1	-	2	1	2	1	2	-	2	3	18			
Heat apoplexy	-	1	-	-	5	1	3	-	1	-	-	-	11			
Delirium tremens	-	5	8	7	15	13	9	10	2	6	3	4	82			
Epilepsy	1	3	1	-	1	1	-	2	1	1	1	-	12			
Respiratory diseases	49	30	29	21	19	18	18	22	13	21	73	42	355			
Abscess and ulcer	64	42	40	59	38	45	38	29	34	46	67	47	549			
Wounds and accidents	63	59	38	27	31	22	19	14	13	27	43	44	400			
All other diseases	77	66	89	75	84	86	77	73	85	70	101	66	949			
736 709 724 713 965 1,184 990 882 826 630 946 791 10,096																
Admitted per Cent. of Average Strength in each Month.																
13.30 12.21 13.84 19.39 23.40 28.59 23.83 22.05 22.04 14.31 16.40 15.65 217.77																

EUROPEAN TROOPS, 1860—continued.

TABLE showing the SICKNESS and MORTALITY among the EUROPEAN TROOPS serving in the *Dinapore, Benares, and Oude* Districts during the Year 1860, and the Prevalence of the principal Diseases in each Month of the Year.

MONTHS.	Average Strength.	Average Number Daily Sick.	Daily Sick per Cent. of Average Strength.	Number of Deaths.	Died per 1,000 of Average Strength.	CAUSES OF DEATH.																			
						Cholera.	Small-pox.	Intermittent Fevers.	Remittent Fevers.	Continued Fevers.	Dysentery, Acute.	Dysentery, Chronic.	Diarrhoea.	Hepatitis, Acute.	Hepatitis, Chronic.	Phthisis Pulmonalis.	Heat Apoplexy.	Delirium Tremens.	Respiratory Diseases.	Heart Diseases.	All other Diseases.	Wounds and Accidents.			
January -	12,189	1,229	10.08	13	-	-	-	1	2	-	4	-	1	2	1	1	-	-	-	-	1	-			
February -	12,552	1,111	8.85	8	-	1	-	-	1	-	-	-	-	1	2	1	-	1	1	-	-	-			
March -	11,824	1,177	9.95	55	-	41	-	-	1	1	6	-	1	1	1	1	-	-	-	-	2	1			
April -	12,148	1,301	10.71	146	-	109	1	1	2	5	8	1	4	2	4	1	3	2	-	1	1	1			
May -	11,006	1,161	10.55	36	-	11	1	-	4	2	7	-	-	2	-	3	2	1	-	-	3	3			
June -	11,097	1,152	10.38	63	-	17	-	1	3	6	2	-	2	2	1	2	20	2	1	1	3	-			
July -	10,900	1,146	10.52	41	-	9	-	2	1	3	1	-	-	4	4	3	6	2	3	1	4	-			
August -	10,890	1,190	10.92	37	-	11	-	3	4	1	7	-	1	2	-	1	-	1	3	1	2	-			
September -	10,880	1,258	11.57	46	-	12	-	2	2	2	8	1	1	5	1	4	-	2	-	1	4	1			
October -	10,643	1,057	9.93	23	-	2	-	-	4	1	1	1	1	3	1	2	-	2	-	-	5	-			
November -	10,322	868	8.41	18	-	1	-	-	3	1	1	1	-	2	1	3	-	-	1	-	3	1			
December -	10,525	805	7.65	12	-	-	1	-	2	-	-	4	1	2	1	-	-	-	1	-	-	-			
						214	3	10	29	22	45	8	12	28	16	22	31	12	10	4	28	4			
						Died per 1,000 of Average Strength.																			
						11,245	1,121	9.97	498	44.28	19.03	.27	.89	2.58	1.95	4.00	.71	1.07	2.50	1.42	1.95	2.75	1.07		
DISEASES.	NUMBER OF ADMISSIONS INTO HOSPITAL IN EACH MONTH.												Total Admissions during the Year.	Admitted per Cent. of Average Strength.	Died per Cent. of Admission.										
	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.													
	Cholera -	-	4	69	192	22	24	17	17	17	3	4	-	369	3.28	58.00									
Small-pox -	2	-	-	1	2	-	-	-	-	-	-	1	6	.05	50.00										
Intermittent fevers -	417	168	229	298	197	350	338	497	510	468	366	392	4,230	86.04	.63										
Remittent fevers -	111	62	167	260	144	225	298	143	206	235	89	50	1,999												
Continued fevers -	128	89	319	658	483	507	428	304	248	167	67	48	3,446												
Dysentery, acute -	28	40	82	119	73	64	77	167	134	70	49	40	943	9.98	4.72										
Dysentery, chronic -	11	4	9	20	17	12	20	18	22	21	14	12	180												
Diarrhoea -	101	86	158	194	102	75	127	166	115	62	42	82	1,310												
Hepatitis, acute -	42	31	40	62	61	70	59	65	74	62	39	45	650	7.89	4.96										
Hepatitis, chronic -	19	23	13	12	13	17	32	29	20	26	17	17	238												
Ophthalmia -	102	74	97	89	74	76	66	84	72	55	64	47	900												
Rheumatism -	91	68	65	46	63	57	60	81	73	71	67	84	826												
Venereal diseases -	609	537	529	427	416	382	344	369	335	356	367	381	5,052	44.92	-										
Phthisis pulmonalis -	4	3	3	6	7	7	10	3	3	5	4	3	58	.51	37.93										
Heat apoplexy -	-	-	1	6	4	34	8	1	1	-	-	1	56	.49	55.35										
Delirium tremens -	9	14	9	12	14	5	8	10	8	5	6	9	109	.96	11.00										
Epilepsy -	6	4	5	7	2	3	2	8	3	9	2	5	56	.49	-										
Respiratory diseases -	71	73	58	62	70	43	64	48	48	48	54	75	714	6.34	1.40										
Abscess and ulcer -	130	105	132	153	153	137	190	123	121	100	94	106	1,544	13.73	-										
Wounds and accidents -	78	43	89	50	62	60	40	42	43	61	59	102	729	6.48	-										
All other diseases -	143	143	151	171	225	169	209	230	180	193	120	137	2,071	18.41	.32										
													25,486												
													Admitted per Cent. of Average Strength in each Month.												
													17.24	12.51	18.81	23.49	20.02	20.87	21.99	22.08	20.52	18.95	14.76	15.55	226.64

EUROPEAN TROOPS, 1860—continued.

TABLE showing the SICKNESS and MORTALITY among the EUROPEAN TROOPS serving in the *Cawnpore, Meerut, and Rohilcund* Districts during the Year 1860, and the Prevalence of the principal Diseases in each Month of the Year.

MONTHS.	Average Strength.	Average Number Daily Sick.	Daily Sick per Cent. of Average Strength.	Number of Deaths.	Died per 1,000 of Average Strength.	CAUSES OF DEATH.																
						Cholera.	Small-pox.	Intermittent Fevers.	Remittent Fevers.	Continued Fevers.	Dysentery, Acute.	Dysentery, Chronic.	Diarrhoea.	Hepatitis, Acute.	Hepatitis, Chronic.	Phthisis Pulmonalis.	Heat Apoplexy.	Delirium Tremens.	Respiratory Diseases.	Heart Diseases.	All other Diseases.	Wounds and Accidents.
January -	9,769	761	7.79	18	-	-	1	1	1	1	1	-	-	9	-	-	-	-	3	-	1	-
February -	10,883	911	8.37	12	-	4	1	-	-	1	-	-	-	-	2	2	-	-	-	-	2	-
March -	10,967	936	8.53	37	-	23	2	-	3	1	3	-	-	-	1	3	1	-	-	-	-	-
April -	11,481	957	8.34	43	-	21	6	-	1	2	3	-	1	1	4	1	2	-	1	-	1	-
May -	11,571	955	8.25	26	-	2	4	-	1	2	1	1	2	2	-	1	1	-	1	-	8	1
June -	11,575	998	8.62	48	-	3	2	-	5	2	-	-	1	4	2	2	20	3	-	-	4	-
July -	11,480	1,016	8.85	25	-	-	-	1	1	3	2	-	2	1	1	8	8	1	1	-	6	-
August -	11,438	1,045	9.14	72	-	37	-	1	3	2	8	-	3	1	2	5	1	1	1	2	5	-
September -	11,264	1,194	10.60	57	-	4	-	1	11	5	21	1	5	6	3	1	1	-	1	-	1	-
October -	11,036	1,120	10.14	31	-	1	-	-	5	1	5	-	6	3	1	2	-	-	3	-	4	-
November -	10,410	908	8.73	27	-	-	-	-	5	-	2	1	1	8	1	2	-	1	1	1	4	-
December -	10,490	756	7.21	19	-	-	-	-	2	1	5	-	-	5	-	2	-	1	-	-	2	1
						95	16	4	38	21	49	3	21	39	14	19	34	7	11	4	38	2
						Died per 1,000 of Average Strength.																
	11,031	1,014	8.54	415	37.62	8.61	1.45	.36	3.44	1.90	4.44	.27	1.90	3.54	1.27	1.72	3.08	.63	.99	.36	3.44	1.18

DISEASES.	NUMBER OF ADMISSIONS INTO HOSPITAL IN EACH MONTH.												Total Admissions during the Year.	Admitted per Cent. of Average Strength.	Died per Cent. of Admissions.
	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.			
Cholera -	-	12	41	37	3	8	5	64	13	3	5	-	191	1.73	49.48
Small-pox -	3	8	17	26	13	7	2	-	-	-	7	-	84	.76	18.99
Intermittent fevers -	130	102	186	255	198	379	306	320	442	456	341	267	3,382		
Remittent fevers -	33	42	43	89	55	100	141	191	379	403	238	62	1,776	69.27	80.
Continued fevers -	66	50	131	348	258	364	407	232	307	203	71	46	2,483		
Dysentery, acute -	42	14	28	39	47	25	35	106	156	106	49	41	688	6.79	6.94
Dysentery, chronic -	13	4	7	1	1	1	1	1	3	7	12	10	61		
Diarrhoea -	70	94	163	183	110	81	93	248	221	111	74	81	1,529	13.86	1.31
Hepatitis, acute -	33	22	29	40	41	33	52	40	35	60	64	38	487	6.62	7.26
Hepatitis, chronic -	26	25	23	22	19	20	16	19	23	18	18	14	243		
Ophthalmia -	83	120	89	93	85	55	52	61	56	45	50	56	845	7.66	-
Rheumatism -	92	91	82	73	57	59	67	85	73	98	66	81	924	8.38	-
Veneral diseases -	290	361	424	327	329	275	243	287	253	249	259	292	3,589	32.54	-
Phthisis pulmonalis -	8	6	6	4	3	4	11	8	1	12	9	12	84	.76	21.34
Heat apoplexy -	-	-	1	3	8	48	19	4	3	1	1	-	88	.79	38.63
Delirium tremens -	-	4	2	6	8	7	6	7	3	5	3	2	53	.48	13.20
Epilepsy -	5	11	4	5	7	6	5	6	6	6	5	3	69	.63	-
Respiratory diseases -	80	77	59	64	76	55	61	56	45	60	92	77	802	7.27	1.26
Abscess and ulcer -	134	170	146	135	152	190	243	135	122	127	92	119	1,765	16.00	-
Wounds and accidents -	120	141	145	117	109	68	85	81	64	92	87	118	1,227	11.12	-
All other diseases -	125	153	221	366	279	308	331	316	271	207	203	181	2,961	26.84	-
	1,353	1,507	1,847	2,233	1,858	2,093	2,181	2,267	2,476	2,269	1,740	1,507	23,331		
	Admitted per Cent. of Average Strength in each Month.														
	13.85	13.84	16.84	19.45	16.05	18.08	18.99	19.82	21.97	20.56	15.25	14.37	211.50		

EUROPEAN TROOPS, 1860—continued.

TABLE showing the SICKNESS and MORTALITY among the EUROPEAN TROOPS serving in the Punjab during the Year 1860, and the Prevalence of the principal Diseases in each Month of the Year.

MONTHS.	Average Strength.	Average Number Daily Sick.	Daily Sick per Cent. of Average Strength.	Number of Deaths.	Died per 1,000 of Average Strength.	CAUSES OF DEATH.																	
						Cholera.	Small-pox.	Intermittent Fevers.	Remittent Fevers.	Continued Fevers.	Dysentery, Acute.	Dysentery, Chronic.	Diarrhoea.	Hepatitis, Acute.	Hepatitis, Chronic.	Phthisis Pulmonalis.	Heat Apoplexy.	Delirium Tremens.	Respiratory Diseases.	Heart Diseases.	All other Diseases.	Wounds and Accidents.	
						3	4	3	23	27	30	12	4	13	20	21	16	7	12	9	28	1	
Died per 1,000 of Average Strength.																							
	16,414	990	6.03	233	14.20	.18	.25	.18	1.40	1.65	1.83	.73	.25	.79	1.22	1.28	.97	.42	.73	.55	1.70	.07	

DISEASES.	NUMBER OF ADMISSIONS INTO HOSPITAL IN EACH MONTH.												Total Admissions during the Year.	Admitted per Cent. of Average Strength.	Died per Cent. of Admissions.
	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.			
Cholera	-	1	-	-	-	3	-	-	1	1	1	-	7	.04	43.00
Small-pox	2	3	6	3	3	2	-	1	-	-	18	23	61	.37	6.06
Intermittent Fevers	144	129	146	413	378	294	321	281	306	412	310	201	3,335	44.34	.73
Remittent Fevers	7	10	8	42	66	55	35	60	99	106	33	12	533		
Continued Fevers	39	44	77	312	607	510	498	616	388	162	92	66	3,411	4.71	5.43
Dysentery, Acute	21	27	37	49	54	50	42	87	107	83	47	41	645		
Dysentery, Chronic	3	5	2	9	12	15	16	14	13	16	13	11	129	9.76	.25
Diarrhoea	66	72	89	162	160	130	149	265	166	149	110	85	1,603		
Hepatitis, Acute	25	22	41	41	32	68	45	49	41	34	33	30	461	5.22	3.86
Hepatitis, Chronic	6	18	26	47	55	42	61	47	37	16	23	17	395		
Ophthalmia	46	85	145	177	118	109	93	105	107	89	84	58	1,216	7.47	-
Rheumatism	122	124	105	114	82	89	136	126	109	108	115	85	1,315	8.01	-
General Diseases	356	328	394	387	392	390	345	351	266	320	310	303	4,142	25.23	-
Phthisis Pulmonalis	1	3	3	4	6	10	17	9	11	6	3	3	76	.47	27.63
Heat Apoplexy	-	-	-	-	1	11	14	9	3	-	-	-	38	.23	42.10
Delirium Tremens	12	1	9	14	12	9	10	5	5	3	6	4	90	.55	7.77
Epilepsy	4	4	7	9	10	10	6	14	5	12	4	3	88	.53	-
Respiratory Diseases	143	115	143	123	149	118	95	113	105	158	148	103	1,513	9.22	.79
Scabs and Ulcer	115	94	90	136	182	190	225	202	190	141	109	110	1,784	10.87	-
Wounds and Accidents	122	102	156	136	145	124	114	118	147	129	133	155	1,581	9.63	-
All other Diseases	152	148	256	322	290	315	363	410	302	236	173	171	3,138	19.12	.29
	1,386	1,335	1,740	2,500	2,754	2,544	2,585	2,862	2,408	2,181	1,765	1,481	25,561		
Admitted per Cent. of Average Strength in each Month.															
	9.33	8.83	11.15	14.70	15.55	14.36	14.68	16.49	13.83	12.72	12.01	10.13	155.72		

EUROPEAN TROOPS, 1860—continued.

COMPARATIVE STATEMENT of the Ratios of SICKNESS and MORTALITY among the EUROPEAN TROOPS serving in the various Provinces of the Bengal Presidency during the Year 1860.

DISEASES.	BENGAL PROPER.			DINAPORE, BENARES, AND OUDE.			CAWNPORE AND MEERUT.			AGRA AND CENTRAL INDIA.			PUNJAB.			BENGAL PRESIDENCY.		
	Average Strength	Daily Sick per Cent. of Strength	Admitted per Cent. of Strength	Average Strength	Daily Sick per Cent. of Strength	Admitted per Cent. of Strength	Average Strength	Daily Sick per Cent. of Strength	Admitted per Cent. of Strength	Average Strength	Daily Sick per Cent. of Strength	Admitted per Cent. of Strength	Average Strength	Daily Sick per Cent. of Strength	Admitted per Cent. of Strength	Average Strength	Daily Sick per Cent. of Strength	Admitted per Cent. of Strength
	14-88	2-78	53-50	3-28	58-00	19-03	1-73	49-48	8-61	6-57	50-00	32-82	0-4	43-00	18	2-26	53-25	12-04
Cholera	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Small-pox	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Fever	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dysentery	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Diarrhoea	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hepatitis	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ophthalmia	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Rheumatism	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Veneral Diseases	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Phthisis Pulmonalis	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Heat Apoplexy	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Delirium Tremens	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Epilepsy	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Respiratory Diseases	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Abscess and Ulcer	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Wounds and Accidents	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
All other Diseases	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	217-77	-	-	226-64	-	44-28	211-50	-	37-62	262-79	-	63-13	155-72	-	14-20	205-15	-	35-64

TABLE showing the GENERAL STATISTICS OF SICKNESS AND MORTALITY in the PRINCIPAL MILITARY STATIONS of the Bengal Presidency.

STATIONS.	Period of Observation.	Average Strength during Period of Observation.	DAILY SICK PER CENT. OF AVERAGE STRENGTH IN EACH MONTH.												Daily Sick of Average Strength for the Year.	Number of Admissions into Hospital.	Admitted of Average Strength.	NUMBER OF DEATHS.		DIED PER 1,000 OF AVERAGE STRENGTH.		
			Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.				A. Cholera.	B. All other Causes.	A. Cholera.	B. All other Causes.	C. All Causes.
Fort William	-	1,198	7-88	5-00	8-39	6-82	8-14	12-09	11-89	13-38	11-53	7-76	6-63	5-69	8-91	2,804	234-06	40	22	33-39	18-36	51-75
Dum-Dum	-	1,242	4-60	5-23	7-26	10-60	11-82	10-17	7-56	7-91	5-97	5-72	5-67	4-97	6-68	2,556	205-80	6	43	4-83	34-62	39-45
Barrackpore	-	1,501	3-91	4-53	3-62	8-48	10-25	11-90	14-79	13-22	11-99	7-37	4-69	8-36	8-70	3,517	234-31	12	27	8-00	17-99	25-99
Berhampore	-	270	6-11	6-32	6-98	7-13	4-01	3-42	6-87	8-21	10-64	10-06	15-47	16-76	8-93	677	250-74	-	12	-	-	44-44
Hazareebaugh	-	663	8-55	7-64	7-75	7-75	8-66	6-71	8-90	10-29	12-33	8-68	9-09	12-81	8-76	1,676	197-25	1	7	1-72	8-59	10-31
Dinapore	-	887	12-46	9-99	13-07	15-39	13-35	11-84	11-79	12-68	11-36	9-17	7-54	7-14	11-69	2,307	260-09	8	33	9-02	37-20	46-22
Ghazepore (11 mths.)	{ Av. strength, Jan. to Apr., 987 } { Av. strength, May to Nov., 316 }	555	17-00	13-29	13-88	9-08	17-22	18-93	15-33	16-36	17-49	20-78	17-22	-	13-17	873	88-65	66	10	67-07	11-56	79-03
Benares and Raj Ghat	-	1,447	13-06	9-17	12-90	14-36	13-60	14-47	14-61	15-82	17-35	12-90	11-05	10-34	17-72	642	204-13	1	14	3-16	44-31	47-47
Azimgurh	-	248	12-70	4-37	11-21	12-91	11-51	10-31	12-67	11-59	7-34	10-47	8-34	8-13	13-14	5,242	362-26	33	74	22-80	51-14	73-94
Goruckpore	-	698	7-67	6-59	5-31	8-24	8-63	6-99	5-79	6-17	8-45	6-54	6-15	5-79	10-33	566	228-23	6	6	14-33	24-19	48-38
Gondah	-	965	6-98	6-78	7-19	7-26	6-63	7-95	7-62	7-51	7-83	7-87	6-01	5-40	6-80	1,432	205-16	10	14	24-19	20-06	34-39
Fyzabad	-	1,054	8-81	9-88	9-28	10-47	8-91	8-43	10-56	11-75	10-79	10-57	6-91	6-32	7-10	2,051	194-59	20	15	18-65	6-22	24-87
Sultanpore	-	257	9-05	10-04	8-33	7-93	13-79	5-05	6-86	8-49	8-74	9-82	8-86	6-94	8-69	542	210-89	1	1	19-00	14-21	33-21
Roy Bareilly	-	678	5-88	5-35	5-17	6-52	5-87	6-20	6-13	5-20	5-73	4-92	3-12	5-57	1-383	157-87	1	18	1-14	20-55	21-69	
Seetapore	-	1,018	5-76	5-26	5-57	9-14	9-59	8-12	8-34	8-21	8-08	7-12	8-05	7-98	7-64	1,455	142-92	3	16	2-95	15-71	18-66
Lucknow	-	2,216	9-22	9-73	11-39	9-80	10-07	10-67	11-72	11-40	13-62	11-51	8-95	7-19	10-42	4,284	193-32	22	47	9-93	21-21	31-14
Allahabad	-	2,460	4-90	5-52	5-78	7-74	7-38	9-73	9-56	9-33	13-29	13-24	12-27	7-00	8-80	6,293	255-81	27	87	10-97	35-37	46-34
Cawnpore	-	1,328	7-77	11-18	12-97	12-76	11-57	11-97	13-88	14-61	18-21	17-51	11-21	8-43	12-77	3,380	275-24	24	43	19-54	35-01	54-55
Fatehgarh	-	9-26	8-05	10-79	9-16	6-72	6-70	6-59	6-81	7-05	8-28	6-91	8-08	7-89	8-36	213-99	-	4	-	-	-	10-36
Bareilly	-	1,008	5-86	4-26	3-64	5-06	5-44	4-82	5-57	6-55	6-19	5-13	4-91	5-45	5-25	1,014	100-59	1	21	1-00	20-83	21-83
Shahjehanpore	-	510	5-39	6-39	8-13	9-66	11-21	9-98	8-87	8-37	6-71	4-19	6-01	3-68	7-61	564	110-58	3	13	5-88	25-50	31-38
Moradabad	-	463	5-94	5-94	6-62	6-61	7-14	7-81	7-44	8-06	9-95	8-11	6-99	6-21	7-23	543	-	-	-	-	-	25-92
Meerut	-	2,317	7-93	7-56	7-86	7-18	7-75	7-45	7-30	6-96	8-14	7-55	6-30	5-06	7-26	3,900	168-32	-	28	67-04	22-34	12-08
Muttra	-	358	5-50	6-97	6-30	9-70	9-52	10-94	8-82	17-80	9-31	6-09	5-44	4-00	8-47	822	229-61	24	8	22-34	22-34	89-38
Delhi	-	1,071	8-11	10-21	10-50	11-15	11-61	10-90	11-41	11-38	12-40	11-02	11-08	11-08	10-84	2,398	223-90	1	31	-93	28-94	29-37
Roorkee	-	443	6-59	9-83	6-90	7-16	7-20	6-30	7-71	6-13	6-55	11-01	5-09	5-09	6-94	943	212-86	-	9	-	-	20-31
Agra	-	1,238	7-08	6-12	5-97	7-72	7-62	8-03	8-85	9-92	11-38	10-13	6-70	5-66	7-06	2,697	217-85	59	31	47-66	25-04	72-70
Morar	-	1,279	5-55	5-34	6-35	9-37	8-07	8-57	12-19	14-44	14-52	14-53	7-57	6-50	9-12	3,553	277-79	87	49	68-02	30-31	106-38
Jhansi	-	583	-	7-65	2-61	5-72	8-15	11-16	11-63	28-02	14-75	10-71	7-61	5-00	9-45	2,067	354-54	13	47	22-86	80-62	102-92
Saugor	-	968	7-59	9-21	11-17	12-43	9-63	11-46	9-32	11-50	11-81	12-04	11-43	6-81	10-46	2,109	217-87	4	14	4-14	14-48	18-62
Nagode	-	225	4-45	5-76	12-87	10-52	9-62	9-48	9-82	7-75	5-56	8-90	9-14	4-23	8-15	573	254-66	15	7	66-66	31-11	97-77
Jubbulpore	-	805	8-18	6-43	6-26	8-47	8-91	8-94	9-01	10-19	12-01	15-28	14-89	13-62	10-21	2,268	281-74	5	18	6-21	22-36	28-57
Unhalla	-	1,892	5-71	8-15	9-87	8-08	7-72	6-41	5-84	5-16	5-39	5-39	6-76	2-99	6-42	2,581	136-41	-	27	-	-	14-27
Dughaisa	-	1,014	-	-	-	9-35	7-18	3-13	6-30	5-83	5-12	5-18	-	-	6-00	740	78-14	-	9	-	-	6-90
Subathoo	-	990	7-47	2-99	4-65	4-41	4-74	4-29	3-90	3-97	4-66	4-25	4-14	3-65	4-22	1,378	122-82	-	9	-	-	6-90
Jullundur	-	816	4-07	5-33	4-08	4-02	4-47	4-96	4-94	4-94	5-50	4-41	3-66	3-91	4-32	1,002	122-79	-	6	-	-	7-35
Ferozepore	-	1,086	6-96	6-62	5-33	7-04	7-58	6-60	7-06	7-06	8-49	7-58	7-31	7-12	6-88	1,251	115-19	1	9	92	8-29	9-21
Meen Meer	-	2,036	5-00	6-96	6-62	5-33	7-04	7-58	6-60	7-06	8-49	7-58	7-31	7-12	6-88	3,368	164-93	2	42	20-62	21-60	21-60
Umritsar	-	470	4-29	4-57	3-90	3-83	5-16	4-12	2-97	4-05	4-77	3-72	5-66	5-33	4-34	379	80-63	-	3	-98	-	6-38
Mooltan	-	836	5-86	5-57	7-04	12-37	9-20	7-06	8-06	8-70	8-83	8-83	7-51	6-78	7-79	1,812	216-74	-	22	-	-	26-31
Dera Ismael Khan	-	109	3-18	87	-	88	-	3-17	4-67	3-13	3-54	4-38	3-13	2-33	7-20	122	111-92	-	1	-	-	9-17
Sealkote	-	1,387	6-78	6-40	5-25	6-02	8-12	9-70	8-41	7-04	8-06	7-34	5-08	4-53	7-20	2,119	152-77	-	15	-	-	10-81
Rawul Pindce	-	1,945	4-36	4-58	5-55	5-09	3-70	5-27	6-04	7-45	6-30	5-35	4-33	5-38	5-34	2,933	150-79	-	28	-	-	14-39
Attock	-	169	-	-	-	3-63	5-76	5-61	4-21	6-52	3-23	3-77	3-70	3-00	4-37	268	158-58	-	1	-	-	5-92
Nowshera	-	744	7-69	-	4-08	4-19	5-21	5-56	6-13	6-93	4-35	6-56	7-14	5-01	5-70	1,525	187-90	-	6	-	-	7-39
Peshawar	-	2,400	5-22	5-00	4-69	5-10	5-59	5-84	6-27	7-16	7-16	6-20	5-46	4-60	5-66	4,297	179-04	-	29	-	-	12-08

EUROPEAN TROOPS 1860—continued.

TABLE showing the Ratio in which the PRINCIPAL DISEASES have contributed to make up the ADMISSION RATE of the Year, in the CHIEF MILITARY STATIONS of the *Bengal* Presidency.

STATIONS.	Average Strength.	ADMITTED INTO HOSPITAL PER CENT. OF AVERAGE STRENGTH.											Admitted Per Cent of Average Strength from all Causes.
		Cholera.	Heat Apoplexy.	Fevers.	Dysentery.	Diarrhoea.	Hepatitis.	Ophthalmia.	Rheumatism.	Veneral Diseases.	Diseases of the Re- spiratory Organs.	All other Causes.	
Fort William - -	1,198	4·92	·25	91·74	10·27	23·12	5·26	4·76	7·93	45·66	3·76	36·39	234·06
Barrackpore - -	1,501	1·27	·33	82·14	14·46	29·18	3·80	4·60	9·66	34·77	7·73	46·37	234·31
Berhampore - -	270	-	-	144·44	6·67	10·00	10·74	8·52	13·33	12·22	9·26	35·56	250·74
Hazareebaugh - -	582	·86	-	68·04	9·11	15·46	·69	2·58	8·59	56·01	3·61	32·30	197·25
Dinapore - -	887	2·59	·45	92·11	20·07	12·40	8·12	7·67	7·33	55·13	10·03	44·19	260·09
Ghazeeport { (3 months)	987	13·68	·10	35·87	5·07	7·19	1·42	·91	1·32	10·84	1·01	11·24	88·65
	316	1·58	-	133·86	2·53	6·64	2·21	7·28	1·58	29·74	2·26	16·45	204·13
Benares - -	1,447	3·25	1·31	167·11	12·23	23·15	17·35	5·60	8·43	64·96	10·29	48·58	362·26
Ázimghur - -	248	4·03	1·61	56·85	6·05	10·49	7·26	4·84	6·05	79·03	6·05	45·97	228·23
Goruckpore - -	698	2·15	·43	63·75	14·62	·72	17·05	9·74	4·87	49·71	4·73	37·39	205·16
Gondah - -	965	2·28	-	33·99	8·70	10·15	·83	6·12	10·78	32·54	4·66	47·77	157·82
Fyzabad - -	1,054	2·75	·09	53·79	4·36	11·95	5·41	11·67	5·60	40·23	6·55	52·19	194·59
Sultanpore - -	257	1·55	·39	84·44	-	3·11	3·89	5·45	5·45	73·93	3·11	29·57	210·89
Roy Bareilly - -	876	·34	-	77·39	1·14	7·53	2·51	5·71	4·34	18·15	5·71	35·05	157·87
Lucknow - -	2,216	1·58	·40	56·27	11·10	9·47	8·98	11·78	8·89	40·52	5·51	38·82	193·32
Seetapore - -	1,018	·39	·78	48·92	4·71	3·54	5·40	9·04	6·19	32·42	3·93	27·60	142·92
Allahabad - -	2,460	2·20	1·22	122·63	5·16	20·85	7·97	6·05	7·08	32·16	8·57	41·87	255·81
Cawnpore - -	1,228	3·50	·49	90·07	8·39	20·20	5·79	17·02	9·44	55·86	6·19	58·31	275·24
Futtehgurh - -	386	·26	·52	70·99	3·63	5·70	4·40	10·88	5·18	60·88	7·77	43·78	213·99
Shahjehanpore - -	510	·78	·19	21·37	3·14	7·06	3·73	9·92	3·53	31·76	3·53	26·27	110·58
Bareilly - -	1,008	·10	·59	17·46	10·41	8·73	4·56	3·97	2·28	24·51	3·47	24·21	100·59
Moradabad - -	463	-	·21	20·95	6·48	6·05	2·81	8·00	2·16	50·11	3·02	17·49	117·28
Meerut - -	2,317	·09	·47	39·66	8·46	9·24	7·72	4·19	9·54	21·45	9·19	58·31	168·32
Delhi - -	1,071	·19	-	64·71	5·60	11·39	4·85	8·22	16·52	41·36	7·75	63·31	223·90
Muttra - -	358	13·96	1·68	89·93	5·04	14·25	12·29	1·68	8·66	24·02	6·70	51·40	229·61
Agra - -	1,238	9·29	1·21	76·50	3·71	18·42	6·38	9·69	7·43	38·29	14·22	32·71	217·85
Morar - -	1,279	13·60	3·91	139·95	9·30	27·91	5·01	5·71	4·14	22·05	8·52	37·69	277·79
Jhansi (11 months) -	583	5·49	6·00	203·26	20·75	23·16	5·83	8·41	9·26	22·13	10·12	40·13	354·54
Saugor - -	968	1·14	·20	84·92	3·10	7·34	6·92	13·53	7·96	48·24	7·23	37·29	217·87
Nagode - -	225	11·56	-	115·56	4·89	12·45	4·00	20·45	12·88	29·33	4·00	39·55	254·66
Jubbulpore - -	805	1·00	·12	140·37	3·85	19·50	5·34	11·92	8·20	52·30	9·94	29·20	281·74
Umballa - -	1,892	-	·11	27·96	3·23	10·09	3·70	5·33	8·67	25·69	7·29	44·34	136·41
Dugshaie (7 months) -	1,014	-	·10	16·37	1·38	5·52	2·47	6·71	5·23	12·13	5·27	13·41	68·59
Subathoo (9 months) -	990	-	-	16·36	6·77	7·58	3·13	17·88	6·06	32·12	3·43	29·49	122·82
Jullundur - -	816	-	-	24·39	3·39	5·02	·86	6·49	3·58	29·41	5·14	44·60	122·79
Ferozepore - -	1,086	·09	-	26·70	1·57	5·16	3·22	4·60	8·65	21·00	8·56	35·64	115·19
Meean Meer - -	2,036	·20	·34	30·50	7·61	12·28	5·45	9·87	8·01	35·81	6·58	48·28	164·93
Lahore Citadel - -	236	-	·42	22·89	2·12	5·93	4·23	3·39	2·12	21·19	4·23	25·85	92·37
Umritsur - -	470	0·21	-	31·07	2·98	4·48	2·77	10·21	·63	16·17	·83	11·28	80·63
Mooltan - -	836	-	1·08	79·55	6·94	17·82	6·69	2·27	9·45	22·97	9·69	60·28	216·74
Sealkote - -	1,387	-	·07	24·37	3·96	4·33	7·49	11·47	12·47	31·80	14·13	42·68	152·77
Rawul Pindee - -	1,945	-	·05	40·10	2·31	8·28	6·68	4·98	7·92	19·64	14·55	46·28	150·79
Attock (9 months) -	169	-	3·55	82·24	5·91	18·34	4·73	1·18	2·98	7·10	5·32	27·22	158·58
Nowshera - -	812	-	·49	82·02	2·92	17·49	2·95	6·15	9·61	8·25	22·41	36·21	187·80
Peshawur - -	2,400	-	·04	83·59	7·62	10·16	4·63	3·17	5·91	22·21	7·75	33·96	179·04

EUROPEAN TROOPS, 1860—continued.

TABLE showing the PREVALENCE of SMALL-POX in each Month, and the Distribution of the DISEASE by STATIONS and PROVINCES.

STATIONS.	Average Strength for the Period of Occupation.	NUMBER OF ADMISSIONS INTO HOSPITAL IN EACH MONTH.												TOTAL Admissions.	Admitted per Cent. of Average Strength.	Number of Deaths.	Died per 1,000 of Average Strength.
		Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.				
Presidency Hospitals - - -	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Fort William - - - -	1,198	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dum-Dum - - - - -	1,242	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Barrackpore - - - -	1,501	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chinsurah Depôt - -	117	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Raneegunge Depôt - -	308	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Berhampore - - - -	270	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	4,636	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Darjeeling Depôt - - -	131	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hazareebaugh - - - -	663	-	-	-	1	-	-	-	-	-	-	-	-	1	-	1	-
Dinapore - - - - -	887	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dehree - - - - -	230	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Shazeepore - - - - -	555	2	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-
Benares - - - - -	1,447	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Azimghur - - - - -	248	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Goruckpore - - - - -	698	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Gondah - - - - -	965	-	-	-	1	-	-	-	-	-	-	-	-	1	-	1	-
Fyzabad - - - - -	1,054	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sultanpore - - - - -	257	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Rae Bareilly - - - -	876	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Seetapore - - - - -	1,018	-	-	-	-	-	-	-	-	-	-	-	1	1	-	1	-
Lucknow - - - - -	2,216	-	-	-	1	-	-	-	-	-	-	-	-	1	-	-	-
	11,245	2	-	-	1	2	-	-	-	-	-	-	1	6	·05	3	·27
Allahabad - - - - -	2,460	-	-	3	-	1	-	-	-	-	-	-	-	4	-	2	-
Cawnpore - - - - -	1,228	-	-	1	7	-	1	2	-	-	-	-	-	11	-	1	-
Allahabad and Cawnpore General Hospitals - - - - -	-	1	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-
Futtehgurh - - - - -	386	-	-	1	1	-	-	-	-	-	-	-	-	2	-	-	-
Meerut - - - - -	101	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Draie - - - - -	205	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bareilly - - - - -	1,008	-	-	1	4	1	2	-	-	-	-	-	-	8	-	2	-
Shahjehanpore - - - -	510	-	2	1	7	-	-	-	-	-	-	-	-	10	-	-	-
Moradabad - - - - -	463	-	-	1	-	-	-	-	-	-	-	-	2	3	-	-	-
Meerut - - - - -	2,317	1	2	8	3	9	3	-	-	-	-	-	5	31	-	7	-
Muttra - - - - -	358	-	4	-	-	-	-	-	-	-	-	-	-	4	-	-	-
Delhi - - - - -	1,071	1	-	1	2	2	1	-	-	-	-	1	-	8	-	3	-
Roorkee - - - - -	443	-	-	-	2	-	-	-	-	-	-	-	-	2	-	1	-
Landour Depôt - - - -	155	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Wynnee Tal Depôt - - -	326	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	11,031	3	8	17	26	13	7	2	-	-	-	1	7	84	·76	16	1·45
Agra - - - - -	1,238	1	-	-	2	2	1	-	-	-	-	-	-	6	-	1	-
Jorar - - - - -	1,279	-	-	-	-	-	-	-	-	-	-	-	5	5	-	-	-
Awaliar District - - -	526	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chansi (11 months) - -	583	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Angor - - - - -	968	-	1	-	-	-	-	-	-	-	-	-	-	1	-	-	-
Agode - - - - -	225	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Abbulpore - - - - -	805	-	-	1	-	-	-	-	-	-	-	-	-	1	-	-	-
	5,575	1	1	1	2	2	1	-	-	-	-	-	5	13	·23	1	·18
Ymballa - - - - -	1,892	1	-	4	1	-	-	-	-	-	-	9	9	24	-	3	-
Bugshaie (7 months) -	1,014	-	-	-	-	1	-	-	-	-	-	-	-	1	-	-	-
Bubathoo (9 months) -	990	-	2	1	2	-	-	-	-	-	-	1	1	7	-	-	-
Cussowlie Depôt - - -	145	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chillour - - - - -	147	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bullundur - - - - -	816	-	1	-	-	-	2	-	-	-	-	1	1	5	-	-	-
erozepore - - - - -	1,086	-	-	-	-	-	-	1	-	-	-	2	3	6	-	-	-
Teen Meer - - - - -	2,036	-	-	-	-	1	-	-	-	-	-	4	4	9	-	-	-
Shahore Citadel - - -	236	-	-	-	-	-	-	-	-	-	-	1	-	1	-	-	-
Imritsur - - - - -	470	1	-	-	-	-	-	-	-	-	-	-	2	3	-	-	-
Govindghur - - - - -	100	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tooltan - - - - -	836	-	-	1	-	-	-	-	-	-	-	-	-	1	-	-	-
Dera Ismael Khan - - -	109	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Kangra - - - - -	103	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Calakote - - - - -	1,387	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-
Belum - - - - -	120	-	-	-	-	1	-	-	-	-	-	-	-	1	-	-	-
Lawul Pindee - - - -	1,945	-	-	-	-	-	-	-	-	-	-	-	3	3	-	-	-
Attock (9 months) - -	169	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Fowshera - - - - -	812	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dampbelpore - - - - -	146	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Peshawur - - - - -	2,400	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Purree Depôt - - - -	166	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	16,414	2	3	6	3	3	2	-	1	-	-	18	23	61	·37	4	·25
BENGAL PRESIDENCY - -	48,901	8	12	24	32	20	10	2	1	-	-	19	36	164	·34	24	·49

EUROPEAN TROOPS, 1860—continued.

TABLE showing the Prevalence of CHOLERA in each Month, and the Distribution of the DISEASE by STATIONS and PROVINCES.

STATIONS.	Average Strength for 12 Months.	NUMBER OF ADMISSIONS INTO HOSPITAL IN EACH MONTH.												TOTAL Admissions.	Admitted per Cent. of Average Strength.	Number of Deaths.	Died per 1,000 of Average Strength.
		Jan.	Feb.	Mar.	Apr.	May	June	July.	Aug.	Sept.	Oct.	Nov.	Dec.				
Presidency Hospitals - - -	-	-	16	22	3	-	2	-	-	1	-	-	-	44	-	25	-
Fort William - - - -	1,198	-	11	8	3	20	13	2	1	1	-	-	-	59	-	40	-
Dum-Dum - - - -	1,242	-	5	-	1	6	-	-	1	1	-	-	-	14	-	6	-
Barrackpore - - - -	1,501	-	4	4	7	1	1	-	-	-	-	-	2	19	-	12	-
Chinsurah Depôt - - -	117	-	3	-	2	-	-	2	-	-	1	1	-	9	-	1	-
Raneegunge Depôt - - -	308	-	2	16	-	-	-	-	-	-	-	10	-	28	-	10	-
Berhampore - - - -	270	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	4,636	-	25	28	13	27	14	4	2	2	1	11	2	129	2.78	69	14.88
Darjeeling, on march to - - -	131	-	-	-	3	-	-	-	-	-	-	-	-	3	-	2	-
Hazareebaugh - - - -	663	-	-	-	-	-	-	4	1	-	-	-	-	5	-	1	-
Dinapore - - - -	887	-	1	2	8	7	3	-	-	-	2	-	-	23	-	8	-
Dhree - - - -	230	-	1	-	1	7	9	4	5	-	-	-	-	27	-	20	-
Ghazepore - - - -	555	-	-	21	115	2	-	1	2	-	-	1	-	142	-	69	-
Benares - - - -	1,447	-	2	28	6	1	1	7	-	-	1	1	-	47	-	33	-
Azinghur - - - -	248	-	-	4	6	-	-	-	-	-	-	-	-	10	-	6	-
Goruckpore - - - -	698	-	-	-	4	-	11	-	-	-	-	-	-	15	-	10	-
Gondah - - - -	965	-	-	12	10	-	-	-	-	-	-	-	-	22	-	18	-
Fyzabad - - - -	1,054	-	-	1	27	-	-	-	-	-	-	1	-	29	-	20	-
Sultanpore - - - -	257	-	-	-	2	-	-	-	-	1	-	1	-	4	-	1	-
Rae Bareilly - - - -	876	-	-	-	3	-	-	-	-	-	-	-	-	3	-	1	-
Seetapore - - - -	1,018	-	-	-	-	4	-	-	-	-	-	-	-	4	-	3	-
Lucknow - - - -	2,216	-	-	1	7	1	-	1	9	16	-	-	-	35	-	22	-
	11,245	-	4	69	192	22	24	17	17	17	3	4	-	369	3.28	214	19.03
Allahabad - - - -	2,460	-	2	20	19	2	-	2	2	1	1	5	-	54	-	27	-
Cawnpore - - - -	1,228	-	-	5	12	1	-	2	19	4	-	-	-	43	-	24	-
Allahabad and Cawnpore General Hospitals. - - - -	-	-	10	12	3	-	3	-	-	-	-	-	-	28	-	11	-
Futtehgurh - - - -	386	-	-	1	-	-	-	-	-	-	-	-	-	1	-	-	-
Humeerpore - - - -	101	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Oraie - - - -	205	-	-	-	-	-	4	-	-	-	2	-	-	6	-	4	-
Bareilly - - - -	1,008	-	-	1	-	-	-	-	-	-	-	-	-	1	-	1	-
Shaljehanpore - - - -	510	-	-	1	3	-	-	-	-	-	-	-	-	4	-	3	-
Moradabad - - - -	463	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Meerut - - - -	2,317	-	-	-	-	-	1	1	-	-	-	-	-	2	-	-	-
Muttra - - - -	358	-	-	-	-	-	-	-	42	8	-	-	-	50	-	24	-
Delhi - - - -	1,071	-	-	1	-	-	-	-	1	-	-	-	-	2	-	1	-
Roorkee - - - -	443	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Landour Depôt - - - -	155	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Nynsee Tal Depôt - - - -	326	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	11,031	-	12	41	37	3	8	5	64	13	3	5	-	191	1.74	95	8.61
Agra - - - -	1,238	-	-	-	-	1	-	-	77	36	1	-	-	115	-	59	-
Morar - - - -	1,279	-	-	-	2	-	-	15	130	25	1	1	-	174	-	87	-
Gwalior District - - - -	526	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Jhansi (11 months) - - -	583	-	-	-	-	-	-	-	31	1	-	-	-	32	-	13	-
Saugor - - - -	968	-	1	-	1	-	-	7	1	-	1	-	-	11	-	4	-
Nagode - - - -	225	-	-	-	26	-	-	-	-	-	-	-	-	26	-	15	-
Jubbulpore - - - -	805	-	-	-	-	1	-	3	1	1	1	-	1	8	-	6	-
	5,575	-	1	-	29	2	-	25	240	63	4	1	1	366	6.57	183	32.82
Umballa - - - -	1,892	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dughshale (7 months) - - -	1,014	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Subathoo (9 months) - - -	990	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Kussowlie Depôt - - - -	145	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Phillour - - - -	147	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Jullundur - - - -	816	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ferozepore - - - -	1,086	-	-	-	-	-	-	-	-	1	-	-	-	1	-	1	-
Meean Meer - - - -	2,036	-	-	-	-	-	3	-	-	-	-	1	-	4	-	2	-
Lahore Citadel - - - -	236	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Umritsur - - - -	470	-	-	-	-	-	-	-	-	-	1	-	-	1	-	-	-
Govindghur - - - -	100	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Mooltan - - - -	836	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-
Dera Ismael Khan - - - -	109	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Kangra - - - -	103	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sealkote - - - -	1,387	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Jhelum - - - -	120	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Rawul Pindee - - - -	1,945	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Attock (9 months) - - - -	169	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Nowshera - - - -	812	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Campbellpore - - - -	146	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Peshawur - - - -	2,400	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Murree Depôt - - - -	166	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	16,414	-	1	-	-	-	3	-	-	1	1	1	-	7	.04	3	.18
BENGAL PRESIDENCY - - - -	48,901	-	59	160	274	54	61	51	323	97	12	22	3	1,106	2.26	589	12.04

EUROPEAN TROOPS, 1860 - continued.

TABLE showing the MORTALITY in each Station, the Causes of DEATH, and the Ratio of DEATHS to STRENGTH.

STATIONS.	Average Strength for the Period of Occupation.	CAUSES OF DEATHS IN HOSPITALS.																	Number of Deaths.	Died per 1,000 of Average Strength.		
		Cholera.	Small-pox.	Intermittent Fevers.	Remittent Fevers.	Continued Fevers.	Dysentery, Acute.	Dysentery, Chronic.	Diarrhoea.	Hepatitis, Acute.	Hepatitis, Chronic.	Phthisis Pulmonalis.	Heat Apoplexy.	Delirium Tremens.	Respiratory Diseases.	Heart Diseases.	All other Diseases.	Wounds and Accidents.		A. Cholera.	B. Other Causes.	C. All Causes.
Presidency Hospitals -	-	25	-	1	-	-	4	4	2	1	6	11	-	3	2	-	5	-	64	-	-	-
Fort William -	1,198	40	-	-	5	-	2	-	-	2	-	1	3	3	2	2	-	2	62	33.39	18.36	51.75
Dum-Dum -	1,242	6	-	1	5	4	19	-	-	5	1	-	2	2	-	3	1	-	49	4.83	34.62	39.45
Barrackpore -	1,501	12	-	2	-	2	10	4	1	1	-	1	5	-	-	1	-	-	39	8.00	17.99	25.99
Chinsurah Depôt -	117	1	-	1	-	-	-	-	-	1	1	1	-	-	1	-	-	-	6	-	-	-
Raneegunge Depôt -	308	10	-	-	-	-	2	-	-	-	-	-	-	1	-	-	-	-	13	-	-	-
Berhampore -	270	-	-	-	-	7	1	-	-	3	-	-	-	-	-	-	1	-	12	-	-	44.44
	4,636	69	-	4	10	13	31	4	1	12	2	3	10	5	4	6	2	2	181	14.88	24.16	39.04
Darjeeling Depôt -	131	2	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	1	7	-	-	-
Hazareebaugh (11 months)	663	1	1	-	1	-	2	-	1	-	-	1	-	-	1	-	-	-	8	1.72	8.59	10.31
Dinapore -	887	8	-	3	3	5	5	-	-	3	2	2	4	-	1	1	4	-	41	9.02	37.20	46.22
Dehree -	230	20	-	1	-	-	7	-	1	-	-	-	3	-	2	-	1	-	36	-	-	-
Ghazee-pore -	555	69	-	-	1	9	4	-	5	-	2	3	-	-	1	-	2	1	95	59.38	46.85	106.23
Benares -	1,447	33	-	4	11	6	8	4	1	12	-	4	10	4	1	1	5	1	107	22.80	51.14	73.94
Azimghur -	248	6	-	-	-	-	1	-	-	-	1	1	2	1	-	-	1	-	12	24.19	24.19	48.38
Goruckpore -	698	10	-	-	2	-	-	1	-	1	-	-	3	3	-	-	3	-	24	14.33	20.06	34.39
Gondah -	965	18	1	-	-	1	3	-	-	-	1	-	-	-	-	-	1	-	24	18.65	6.22	24.87
Fyzabad -	1,054	20	-	-	2	-	3	3	-	1	-	3	1	-	1	-	-	-	35	19.00	14.21	33.21
Sultanpore -	257	1	-	-	-	1	-	-	-	-	1	-	-	-	-	-	-	-	2	3.89	3.89	7.78
Rae Bareilly -	876	1	-	1	-	-	-	-	2	4	1	2	-	2	1	-	5	-	19	1.14	20.55	21.69
Seetapore -	1,018	3	1	-	2	-	4	-	1	1	1	-	3	-	-	1	2	-	19	2.95	15.71	18.66
Lucknow -	2,216	22	-	1	7	-	6	-	1	6	5	6	5	2	2	1	4	1	69	9.93	21.21	31.14
	11,245	214	3	10	29	22	45	8	12	28	16	22	31	12	10	4	28	4	498	19.03	25.25	44.28
Allahabad -	2,160	27	2	-	14	6	22	-	4	13	1	2	11	3	3	-	6	-	114	10.97	35.37	46.31
Cawnpore -	1,228	24	1	-	8	-	7	1	9	4	-	3	2	2	2	-	4	-	67	19.51	35.91	54.55
Allahabad and Cawnpore General Hospitals.	-	11	-	-	1	-	2	-	-	5	1	2	4	1	1	-	2	-	30	-	-	-
Futtehgurh -	386	-	-	-	1	-	1	-	-	-	-	-	2	-	-	-	-	-	4	-	-	10.36
Humterpore -	101	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	10.00
Orate -	205	4	-	1	5	-	1	1	-	-	-	-	7	-	-	-	-	-	19	19.51	73.17	92.68
Bareilly -	1,008	1	2	-	-	-	8	-	-	4	2	1	1	-	-	-	3	-	22	1.00	20.83	21.83
Shahjehanpore -	510	3	-	-	3	2	-	-	1	1	2	1	-	-	-	3	-	-	16	5.88	25.50	31.38
Moradabad -	463	-	-	-	-	-	3	-	1	1	-	2	1	1	-	-	1	-	12	-	-	25.92
Meerut -	2,317	-	7	1	2	4	-	-	6	1	3	1	-	-	-	2	1	-	28	-	-	12.08
Muttra -	358	24	-	-	2	1	-	-	-	-	-	1	3	-	-	-	-	1	32	67.04	22.34	89.38
Delhi -	1,071	1	3	1	-	6	3	-	1	5	1	3	-	-	1	-	7	-	32	93	28.94	29.87
Roorkee -	443	-	1	-	2	1	2	-	-	-	-	-	1	-	-	1	1	-	9	-	-	20.31
Landour Depôt -	155	-	-	-	-	-	-	-	1	-	4	-	-	-	1	1	2	-	9	-	-	-
Nyne Tal Depôt -	326	-	-	1	-	-	-	-	1	5	-	3	-	-	3	-	7	-	20	-	-	-
	11,031	95	16	4	38	21	49	3	21	39	14	19	34	7	11	4	38	2	415	8.61	29.01	37.62
Agra -	1,238	59	1	2	5	-	1	-	-	2	3	4	8	-	2	-	2	1	90	47.66	25.04	72.70
Morar -	1,279	87	-	1	8	1	4	4	4	2	4	1	11	2	2	1	4	-	136	68.02	38.31	106.33
Gwalior District -	526	-	-	-	-	-	-	-	1	1	1	-	-	-	-	-	-	-	3	-	-	4.29
Jhansi (11 months)	583	13	-	-	6	-	15	3	-	-	-	6	-	13	1	2	1	-	60	22.30	80.62	102.92
Saugor -	968	4	-	1	-	1	2	-	1	-	1	1	2	1	-	-	2	2	18	4.14	14.48	18.62
Nagode -	225	15	-	-	-	1	-	-	-	-	-	-	-	-	-	-	5	1	22	66.66	31.11	97.77
Jubbulpore -	805	5	-	3	1	2	7	-	1	1	-	1	-	-	-	-	1	1	23	6.21	22.36	28.57
	5,575	183	1	7	20	5	29	7	7	6	15	7	34	4	6	2	14	5	352	32.82	30.31	63.13
Umballa -	1,892	-	3	-	1	5	5	-	-	2	-	3	-	-	3	-	5	-	27	-	-	14.27
Dugshaie (7 months)	1,014	-	-	1	-	-	2	1	1	-	2	1	-	-	1	-	-	-	9	-	-	6.90
Subathoo (9 months)	999	-	-	-	1	1	1	-	-	1	1	-	-	-	1	1	2	-	9	-	-	9.09
Kussowlie Depôt -	145	-	-	-	1	-	1	-	-	-	1	1	-	-	1	-	3	-	8	-	-	-
Phillour -	147	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Jullundur -	816	-	-	-	1	-	1	-	-	-	1	2	-	-	-	-	1	-	6	-	-	7.35
Ferozepore -	1,086	1	-	-	1	-	1	1	1	1	-	-	-	-	2	1	1	-	10	92	8.29	9.21
Meeran Meer -	2,036	2	-	1	6	2	5	5	2	2	3	3	2	1	1	3	5	1	41	98	20.62	21.60
Lahore Citadel -	236	-	-	-	-	-	1	-	-	-	-	-	1	-	-	-	1	-	3	-	-	12.71
Umritsur -	470	-	-	-	3	-	-	-	-	-	-	-	-	-	-	-	-	-	3	-	-	6.38
Govindghur -	109	-	-	-	-	-	1	-	-	-	-	-	1	-	-	-	-	-	2	-	-	20.00
Mooltan -	836	-	-	-	2	1	4	-	-	1	2	-	7	2	1	-	2	-	22	-	-	26.31
Dera Ismael Khan -	109	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	1	-	-	9.17
Kangra -	103	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	1	-	-	9.18
Sealkote -	1,387	-	-	-	1	2	1	-	-	4	3	1	-	2	-	-	1	-	15	-	-	10.81
Jhelum -	120	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Rawul Pindee -	1,945	-	1	-	3	3	3	1	-	2	1	7	2	-	1	-	4	-	28	-	-	14.39
Attock (9 months)	169	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	1	-	-	5.92
Nowshera -	812	-	-	-	-	4	-	-	-	-	-	-	1	-	-	1	-	-	6	-	-	7.39
Campbellpore -	146	-	-	-	-	-	-	-	-	-	-	1	-	-	-	1	-	-	2	-	-	9.35
Peshawur -	2,400	-	-	1	3	8	1	4	-	-	4	2	-	1	1	2	2	-	29	-	-	12.08
Murree Depôt -	166	-	-	-	-	1	2	-	-	-	2	-	-	1	-	-	1	-	7	-	-	-
	16,114	3	4	3	23	27	30	12	4	13	20	21	16	7	12	9	28	1	233	18	14.02	14.20
BENGAL PRESIDENCY	48,901	589	24	29	120	88	191	38	47	99	73	83	125	38	45	25	115	14	1,743	12.04	23.60	35.64

TABLE showing the Causes of DEATH and INVALIDING.

TOTAL LOSS TO THE SERVICE BY DEATH AND INVALIDING, 3,955. PER 1,000 OF AVERAGE STRENGTH, 80·88.

NUMBER OF MEN LOST TO THE SERVICE BY DEATH, 1,799.				NUMBER OF MEN LOST TO THE SERVICE BY INVALIDING, 2,156.*			
CAUSES OF DEATH.	Died in Hospital.	Died out of Hospital.	Died per 1,000 of Strength.	CAUSES OF INVALIDING.	Invalided for Discharge from the Service.	Invalided for Change of Climate.	Invalided per 1,000 Strength.
Variola - - - - -	24	-	·49	Febris - - - - -	71	53	2·54
Scarlatina - - - - -	1	-	-	Ophthalmia - - - - -	111	51	3·31
Tonsillitis - - - - -	1	-	-	Dysentery - - - - -	89	85	3·56
Febris - - - - -	237	-	4·85	Diarrhœa - - - - -	23	17	·82
Erysipelas - - - - -	4	-	-	Cholera - - - - -	4	3	-
Anthrax - - - - -	1	-	-	Rheumatismus - - - - -	265	137	8·22
Dysentery - - - - -	229	-	4·68	Syphilis - - - - -	28	28	-
Diarrhœa - - - - -	47	-	·96	Bubo - - - - -	1	1	1·39
Cholera - - - - -	589	-	12·04	Stricture Urethræ - - - - -	6	4	-
Rheumatismus - - - - -	6	-	-	Anasarca - - - - -	3	1	-
Syphilis - - - - -	6	-	-	Scrofula - - - - -	12	5	-
Bubo - - - - -	1	-	-	Phthisis Pulmonalis - - - - -	55	24	-
Stricture Urethræ - - - - -	1	-	-	Hæmoptysis - - - - -	3	2	2·15
Hydrophobia - - - - -	4	-	-	Abscessus Psoanus - - - - -	1	-	-
Febris a fame - - - - -	1	-	-	Morbus Coxæ - - - - -	2	1	-
Scorbutus - - - - -	1	-	-	Apoplexia - - - - -	4	10	-
Ebriositas - - - - -	2	-	-	Insolatio - - - - -	2	-	-
Anasarca - - - - -	4	-	-	Paralysis - - - - -	12	6	-
Carcinoma - - - - -	1	-	-	Hemiplegia - - - - -	4	-	-
Tumor - - - - -	2	-	-	Paraplegia - - - - -	3	-	-
Scrofula - - - - -	1	-	-	Mania - - - - -	12	2	-
Abscessus Psoanus - - - - -	1	-	-	Monomania - - - - -	1	-	·79
Phthisis Pulmonalis - - - - -	83	-	1·70	Dementia - - - - -	16	8	-
Hæmoptysis - - - - -	4	-	-	Epilepsia - - - - -	34	4	·77
Meningitis - - - - -	2	-	-	Cephalæa - - - - -	2	2	-
Encephalitis - - - - -	5	-	-	Neuralgia - - - - -	2	1	-
Apoplexia - - - - -	125	16	2·88	Otitis - - - - -	9	2	-
Paralysis - - - - -	3	-	-	Dysœcœa - - - - -	5	6	-
Hemiplegia - - - - -	1	-	-	Morbus Cordis - - - - -	44	22	-
Paraplegia - - - - -	1	-	-	Palpitatio - - - - -	31	10	2·29
Delirium Tremens - - - - -	38	-	·77	Aneurisma - - - - -	3	2	-
Mania - - - - -	1	-	-	Varix - - - - -	6	1	-
Dementia - - - - -	7	-	-	Epistaxis - - - - -	-	2	-
Cephalæa - - - - -	1	-	-	Bronchitis - - - - -	41	24	-
Morbus Cordis - - - - -	20	4	·51	Pleuritis - - - - -	1	1	-
Pericarditis - - - - -	1	-	-	Pneumonia - - - - -	2	1	1·45
Aneurisma - - - - -	4	7	-	Asthma - - - - -	1	-	-
Syncope - - - - -	1	-	-	Perituitis - - - - -	1	-	-
Hæmorrhagia - - - - -	1	-	-	Hernia - - - - -	7	3	-
Bronchitis - - - - -	16	-	-	Dyspepsia - - - - -	10	8	-
Pleuritis - - - - -	3	-	-	Hæmatemesis - - - - -	1	1	-
Pneumonia - - - - -	24	-	·92	Hæmorrhoids - - - - -	14	2	-
Dyspnœa - - - - -	1	-	-	Fistula in Ano - - - - -	1	-	-
Gastritis - - - - -	4	-	-	Splenitis - - - - -	9	9	-
Enteritis - - - - -	1	-	-	Hepatitis - - - - -	177	141	6·50
Peritonitis - - - - -	4	-	-	Icterus - - - - -	4	-	-
Dyspepsia - - - - -	2	-	-	Ascites - - - - -	3	-	-
Colica - - - - -	3	-	-	Melæna - - - - -	-	1	-
Hæmatemesis - - - - -	1	-	-	Nephritis - - - - -	2	1	-
Melæna - - - - -	1	-	-	Ischuria - - - - -	1	-	-
Splenitis - - - - -	3	-	-	Cystitis - - - - -	1	1	-
Hepatitis - - - - -	172	-	3·52	Albumenuria - - - - -	1	-	-
Icterus - - - - -	2	-	-	Orchitis - - - - -	6	3	-
Ascites - - - - -	6	-	-	Hydrocele - - - - -	-	1	-
Nephritis - - - - -	3	-	-	Arthritis - - - - -	2	-	-
Ischuria - - - - -	2	-	-	Ostitis - - - - -	3	1	-
Albumenuria - - - - -	2	-	-	Exostosis - - - - -	3	-	-
Caries - - - - -	1	-	-	Necrosis - - - - -	2	2	-
Necrosis - - - - -	1	-	-	Caries - - - - -	1	-	-
Abscessus - - - - -	2	-	-	Contractura - - - - -	4	2	-
Cachexia - - - - -	3	-	-	Morbi Cutis - - - - -	7	2	-
Debilitas - - - - -	6	-	-	Abscessus - - - - -	5	2	-
Struck by Lightning - - - - -	-	1	-	Ulcus - - - - -	4	4	-
Rupture of Spleen - - - - -	-	1	-	Tumor - - - - -	1	-	-
Rupture of Bladder - - - - -	1	-	-	Debilitas (worn out) - - - - -	131	66	4·03
Drowned - - - - -	-	15	-	Ambustio - - - - -	1	-	-
Fracture - - - - -	5	-	-	Luxatura - - - - -	1	1	-
Contusion - - - - -	3	-	-	Subluxatio - - - - -	4	-	-
Concussion - - - - -	1	-	-	Fractura - - - - -	12	3	-
Concussion of Brain - - - - -	4	1	·77	Contusio - - - - -	5	3	-
Incised wound - - - - -	1	-	-	Concussio - - - - -	1	2	1·11
Gunshot wound - - - - -	-	1	-	Concussio Cerebri - - - - -	1	-	-
Homicide - - - - -	-	1	-	Vulnus - - - - -	11	5	-
Suicide - - - - -	-	4	-	Amputatio - - - - -	2	-	-
Executed - - - - -	-	1	-	Accident - - - - -	2	-	-
Found dead; cause of death unknown - - - - -	-	4	-	Not specified - - - - -	14	12	-
Disease not specified - - - - -	3	-	-				
Ratio per 1,000 for Deaths from causes not specially calculated.	-	-	2·68	Ratio, per 1,000, for Invaliding from causes not specially calculated.	-	-	5·16
	1,743	56	36·77		1,364	792	44·09

* See note to Table 15.

EUROPEAN TROOPS, 1861.

TABLE showing the SICKNESS and MORTALITY among the EUROPEAN TROOPS serving in the *Bengal* Presidency, during the Year 1861, and the Prevalence of the principal Diseases in each Month of the Year.

MONTHS.	Average Strength.	Average Number Daily Sick.	Daily Sick per Cent. of Average Strength.	Number of Deaths.	Died per 1,000 of Average Strength.	CAUSES OF DEATHS IN HOSPITAL.																	
						Cholera.	Small-pox.	Intermittent Fevers.	Remittent Fevers.	Continued Fevers.	Dysentery, Acute.	Dysentery, Chronic.	Diarrhoea.	Hepatitis, Acute.	Hepatitis, Chronic.	Phthisis Pulmonalis.	Heat Apoplexy.	Delirium Tremens.	Respiratory Diseases.	Heart Diseases.	All other Diseases.	Wounds and Accidents.	
January	42,494	2,896	6·81	61	-	2	10	2	4	1	6	1	1	6	2	5	-	1	13	-	6	1	
February	45,032	3,112	6·91	48	-	1	4	1	1	1	4	2	-	8	3	3	2	-	7	1	10	-	
March	44,021	3,208	7·29	51	-	12	9	2	1	3	3	-	2	4	2	2	-	1	3	2	4	1	
April	46,907	3,840	8·19	91	-	13	8	2	1	9	8	1	6	5	6	8	3	3	4	5	9	-	
May	46,500	4,011	8·62	100	-	13	7	6	2	9	10	2	4	6	2	3	16	4	7	-	8	1	
June	46,433	3,901	8·40	88	-	13	4	1	1	6	6	1	4	4	2	13	12	1	8	2	8	2	
July	46,076	4,060	8·79	316	-	231	1	2	6	11	16	2	9	9	3	10	4	3	2	2	5	-	
August	45,766	4,381	9·57	768	-	658	-	5	10	15	27	1	15	7	2	7	10	1	2	1	7	-	
September	45,114	4,518	10·01	227	-	113	-	1	13	19	19	2	15	12	1	7	9	2	3	1	10	-	
October	44,686	4,023	9·00	122	-	6	-	7	8	11	19	8	12	8	7	8	1	1	6	3	16	1	
November	42,821	3,303	7·71	71	-	3	-	3	3	3	11	4	5	8	3	10	2	3	2	3	7	1	
December	42,630	2,896	6·79	66	-	-	-	2	2	4	4	8	3	11	9	7	1	-	4	1	10	-	
						1065	43	34	52	92	133	32	76	88	42	83	60	20	61	21	100	7	
Died per 1,000 of Average Strength.																							
	44,879	3,680	8·20	2,609	44·77	23·73	·96	·76	1·16	2·95	2·96	·71	1·69	1·96	·93	1·85	1·34	·45	1·36	·47	2·23	·16	

Deaths out of Hospital, 53. Died per 1,000 of Average Strength, 1·16.

DISEASES.	NUMBER OF ADMISSIONS INTO HOSPITAL IN EACH MONTH.												Total Admissions during the Year.	Admitted per Cent. of Average Strength.	Died per Cent. of Admissions.
	Jan'y.	Feb.	March.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.			
Cholera	6	5	23	29	24	21	399	995	148	8	4	1	1,663	3·71	64·04
Small-pox	48	26	47	63	30	8	3	-	-	-	1	1	232	·52	18·53
Intermittent Fevers	977	668	692	1,062	870	1,034	1,675	1,654	2,950	3,826	2,481	1,875	19,764	71·52	·55
Remittent Fevers	52	43	54	168	152	244	345	468	1,219	501	156	57	3,459		
Continued Fevers	187	192	457	1,484	1,034	777	1,009	1,214	1,190	868	329	134	8,875		
Dysentery	168	151	143	219	172	219	340	464	364	287	224	187	2,938	6·55	5·62
Diarrhoea	285	225	334	627	569	529	1,443	1,284	699	474	304	257	7,030	15·66	1·08
Hepatitis	204	186	192	256	240	222	301	252	253	276	175	161	2,708	6·04	4·80
Ophthalmia	240	245	275	419	236	197	222	229	226	304	171	185	2,949	6·57	-
Rheumatism	377	294	304	367	280	321	419	290	288	336	260	313	3,849	8·58	-
Veneral Diseases	1,435	1,473	1,452	2,032	1,447	1,318	1,536	1,143	977	1,414	1,156	1,184	16,567	36·91	-
Phthisis Pulmonalis	26	29	17	20	17	23	33	30	29	23	24	36	307	·68	27·03
Heat Apoplexy	1	3	-	8	20	21	15	14	13	2	1	-	98	·22	61·22
Delirium Tremens	15	19	10	20	33	18	26	15	8	21	14	6	205	·46	9·75
Epilepsy	14	10	11	14	13	11	22	19	13	19	9	9	164	·36	-
Respiratory Diseases	396	351	370	434	299	264	305	200	191	275	278	249	3,612	8·05	1·69
Abscess and Ulcer	370	414	346	487	512	581	542	415	393	418	337	327	5,142	11·46	-
Wounds and Accidents	359	310	344	428	338	266	321	225	269	347	285	390	3,882	8·65	-
All other Diseases	616	560	563	853	879	706	931	815	693	732	534	480	8,362	18·63	·31
	5,776	5,204	5,634	8,995	7,165	6,780	9,887	9,726	9,923	10,131	6,743	5,842	91,806		
Admitted per Cent. of Average Strength in each Month.															
	13·59	11·56	12·79	19·18	15·41	14·60	21·46	21·25	22·00	22·67	15·74	13·70	204·56		

EUROPEAN TROOPS, 1861—continued.

TABLE showing the SICKNESS and MORTALITY among the EUROPEAN TROOPS serving in Bengal Proper, during the Year 1861, and the Prevalence of the principal Diseases in each Month of the Year.

MONTHS.	CAUSES OF DEATH.																					
	Average Strength.	Average Number Daily Sick.	Daily Sick per Cent. of Average Strength.	Number of Deaths.	Died per 1,000 of Average Strength.	Cholera.	Small-pox.	Intermittent Fevers.	Remittent Fevers.	Continued Fevers.	Dysentery, Acute.	Dysentery, Chronic.	Diarrhœa.	Hepatitis, Acute.	Hepatitis, Chronic.	Phthisis Pulmonalis.	Heat Apoplexy.	Delirium Tremens.	Respiratory Diseases.	Heart Diseases.	All other Diseases.	Wounds and Accidents.
January	4,088	308	7·53	7	—	1	—	—	1	—	1	1	—	1	1	1	—	—	—	—	—	—
February	4,058	301	7·42	1	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
March	3,635	270	7·43	10	—	9	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—
April	4,463	291	6·52	13	—	6	—	—	—	—	2	—	—	2	—	1	—	—	1	1	1	—
May	3,719	274	7·37	10	—	3	—	—	—	—	3	1	—	1	—	—	1	—	—	—	1	—
June	3,683	309	8·39	9	—	2	—	—	—	1	1	—	—	—	—	3	—	—	—	—	2	—
July	3,438	322	9·36	12	—	—	—	—	2	1	2	1	—	2	—	—	1	2	1	—	—	—
August	3,585	306	8·63	14	—	—	—	—	—	—	7	1	1	2	—	—	1	—	—	—	1	—
September	3,568	276	7·74	4	—	—	—	—	—	1	2	1	—	—	—	—	1	—	—	—	1	—
October	3,950	279	7·06	17	—	2	—	—	2	4	3	1	—	—	1	1	—	—	1	1	1	—
November	3,496	226	6·46	6	—	—	—	—	2	—	—	—	—	1	—	—	1	—	—	1	1	—
December	2,579	142	5·51	8	—	—	—	—	—	3	1	1	—	2	1	—	—	—	—	—	—	—
						24	—	—	7	10	22	7	2	11	3	6	4	2	3	3	7	—
Died per 1,000 of Average Strength.																						
	3,689	275	7·45	111	30·09	6·51	—	—	1·90	2·71	5·96	1·90	·54	2·98	·81	1·62	1·08	·54	·81	·81	1·90	—

DISEASES.	NUMBER OF ADMISSIONS INTO HOSPITAL IN EACH MONTH.												Total Admissions during the Year.	Admitted per Cent. of Average Strength.	Died per Cent. of Admissions.
	Jan.	Feb.	March.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.			
Cholera	4	3	16	15	6	3	1	—	—	2	—	—	50	1·35	48·00
Small-pox	4	—	—	—	—	—	—	—	—	—	—	—	4	·11	—
Intermittent Fevers	93	71	70	60	94	176	280	163	106	152	92	81	1,438	58·80	·78
Remittent Fevers	3	4	—	—	3	6	4	2	16	27	5	—	70	—	—
Continued Fevers	7	20	29	90	38	48	56	62	130	89	59	33	661	—	—
Dysentery	51	40	29	42	27	51	95	65	47	49	32	30	558	15·13	5·20
Diarrhœa	54	53	88	113	70	112	141	86	62	68	65	32	944	25·59	·21
Hepatitis	22	11	14	16	12	13	15	14	17	22	13	10	179	4·85	7·82
Ophthalmia	29	18	8	15	15	17	14	13	24	71	20	13	257	6·97	—
Rheumatism	42	44	33	41	21	26	37	30	26	34	20	15	369	10·00	—
Venereal Diseases	133	125	104	113	108	67	116	67	57	70	80	55	1,095	29·68	—
Phthisis Pulmonalis	3	1	2	4	—	1	1	3	4	3	1	1	24	·65	25·00
Heat Apoplexy	—	—	—	—	1	—	2	1	1	1	1	—	7	·19	57·14
Delirium Tremens	2	8	4	1	5	1	9	2	1	4	4	—	41	1·11	4·90
Epilepsy	1	2	4	1	2	2	1	5	2	3	2	—	25	·68	—
Respiratory Diseases	37	30	25	32	20	17	26	18	23	22	23	10	283	7·67	1·06
Abscess and Ulcer	35	38	22	37	35	27	52	43	48	54	33	22	446	12·09	—
Wounds and Accidents	23	24	21	39	33	29	31	27	26	33	31	26	343	9·30	—
All other Diseases	75	75	75	96	82	62	96	77	104	103	67	15	927	25·13	·28
	618	567	544	715	572	658	977	678	694	807	548	343	7,721		
Admitted per Cent. of Average Strength in each Month.															
	15·12	13·97	14·97	16·02	15·38	17·87	28·41	18·91	19·45	20·43	15·67	13·30	209·30		

EUROPEAN TROOPS, 1861—continued.

TABLE showing the SICKNESS and MORTALITY among the EUROPEAN TROOPS serving in the Dinapore, Benares, and Oude Districts during the Year 1861, and the prevalence of the principal Diseases in each Month of the Year.

MONTHS.	Average Strength.	Average Number daily Sick.	Daily Sick per Cent. of Average Strength.	Number of Deaths.	Died per 1,000 of Average Strength.	CAUSES OF DEATH.																	
						Cholera.	Small-pox.	Intermittent Fevers.	Remittent Fevers.	Continued Fevers.	Dysentery, Acute.	Dysentery, Chronic.	Diarrhoea.	Hepatitis, Acute.	Hepatitis, Chronic.	Phthisis Pulmonalis.	Heat Apoplexy.	Delirium Tremens.	Respiratory Diseases.	Heart Diseases.	All other Diseases.	Wounds and Accidents.	
January -	9,526	587	6.16	9	-	-	1	-	-	-	2	-	-	2	-	1	-	-	3	-	4	1	
February -	9,755	672	6.89	9	-	-	1	-	-	-	2	-	-	2	-	1	2	-	-	1	-	-	
March -	9,844	715	7.26	13	-	-	1	2	-	-	-	-	-	2	1	1	-	1	1	2	1	-	
April -	9,505	813	8.55	19	-	2	1	-	1	1	3	-	-	1	2	-	-	3	-	1	4	-	
May -	9,691	860	8.87	14	-	-	1	-	-	2	1	1	-	1	-	2	1	1	3	1	1	-	
June -	9,644	826	8.56	12	-	1	-	-	-	-	2	-	-	2	-	5	1	-	-	-	1	-	
July -	9,625	849	8.82	15	-	1	-	1	2	1	3	-	-	1	-	3	1	-	-	-	2	-	
August -	9,602	893	9.30	21	-	4	-	1	2	-	6	-	1	3	-	1	1	-	1	-	1	-	
September -	9,609	840	8.74	22	-	1	-	-	5	1	2	-	1	4	1	1	1	1	2	-	2	-	
October -	9,468	683	7.21	14	-	-	-	-	1	1	2	1	1	1	1	1	-	-	2	-	3	-	
November -	9,201	538	5.85	8	-	1	-	-	-	-	-	-	1	1	-	2	1	2	-	-	-	-	
December -	10,337	564	5.46	13	-	-	-	-	-	-	-	-	2	2	1	2	-	-	2	-	4	-	
						10	4	4	12	6	21	2	6	20	6	19	8	8	14	2	25	2	
Died per 1,000 of Average Strength.																							
						1.04	.41	.41	1.24	.62	2.17	.21	.62	2.07	.62	1.97	.84	.84	1.45	.21	2.59	.21	
DISEASES.	NUMBER OF ADMISSIONS INTO HOSPITAL IN EACH MONTH.												Total Admissions during the Year.	Admitted per Cent. of Average Strength.	Died per Cent. of Admissions.								
	Jan.	Feb.	March.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.											
Cholera -	1	-	-	4	-	3	4	9	3	-	-	1	25	.26	40.00								
Small-pox -	5	2	12	11	7	-	-	-	-	-	-	-	37	.38	10.81								
Intermittent Fevers -	246	191	165	189	167	187	245	205	168	158	134	169	2,224	43.11	5.3								
Remittent Fevers -	14	10	32	67	35	53	85	55	55	61	12	14	493	-	-								
Continued Fevers -	35	40	104	460	200	129	103	138	114	64	30	29	1,446	-	-								
Dysentery -	31	26	37	56	34	47	60	80	67	53	41	29	561	5.81	4.10								
Diarrhoea -	60	47	63	114	86	65	142	91	68	48	40	39	863	8.94	.70								
Hepatitis -	51	38	46	41	58	37	72	67	75	70	34	21	610	6.32	4.26								
Phthisis -	37	52	67	92	56	50	63	38	32	48	39	21	595	6.16	-								
Pneumatism -	78	61	46	84	59	61	80	61	59	66	37	71	763	7.90	-								
General Diseases -	335	296	340	415	277	287	331	322	235	319	252	299	3,708	38.40	-								
Phthisis Pulmonalis -	2	6	3	8	2	4	5	8	3	4	4	2	51	.53	37.25								
Heat Apoplexy -	1	2	-	-	4	3	1	2	1	-	-	-	14	.15	57.14								
Delirium Tremens -	3	3	4	7	8	3	5	3	2	6	1	1	46	.47	17.10								
Epilepsy -	3	-	2	3	2	2	7	3	-	1	-	1	24	.25	-								
Respiratory Diseases -	69	84	82	60	42	49	54	47	41	43	44	45	660	6.84	2.12								
Scarcity and Ulcer -	101	82	95	114	108	123	68	96	82	101	78	82	1,130	11.71	-								
Wounds and Accidents -	53	49	78	60	47	55	60	52	63	70	44	57	688	7.13	-								
All other Diseases -	114	87	120	195	165	132	182	153	140	139	86	94	1,607	16.64	.34								
												15,545											
Admitted per Cent. of Average Strength in each Month.																							
												161.00											

EUROPEAN TROOPS, 1861—continued.

TABLE showing the SICKNESS and MORTALITY among the EUROPEAN TROOPS serving in the *Agra District* and in *Central India* during the Year 1861, and the prevalence of the principal Diseases in each Month of the Year.

MONTHS.	Average Strength.	Average Number daily Sick.	Daily Sick per Cent. of Average Strength.	Number of Deaths.	Died per 1,000 of Average Strength.	CAUSES OF DEATH.																	
						Cholera.	Small-pox.	Intermittent Fevers.	Remittent Fevers.	Continued Fevers.	Dysentery, Acute.	Dysentery, Chronic.	Diarrhoea.	Hepatitis, Acute.	Hepatitis, Chronic.	Phthisis Pulmonalis.	Heat Apoplexy.	Delirium Tremens.	Respiratory Diseases.	Heart Diseases.	All other Diseases.	Wounds and Accidents.	
January -	4,966	386	7.77	11	-	-	3	1	2	-	1	-	-	1	-	1	-	-	2	-	-	-	
February -	5,829	403	6.91	10	-	-	1	1	-	-	1	-	-	2	-	-	-	-	1	1	4	-	
March -	5,542	408	7.36	5	-	-	-	-	-	2	-	-	-	-	-	-	-	-	1	1	1	-	
April -	5,634	453	8.04	6	-	-	1	1	-	1	-	1	1	-	-	-	-	-	-	1	1	-	
May -	5,714	486	8.51	10	-	-	-	1	-	2	-	-	1	1	-	-	3	-	1	-	1	-	
June -	5,723	445	7.78	12	-	2	-	-	-	-	1	1	1	-	1	3	-	-	2	-	1	-	
July -	5,670	528	9.31	104	-	95	-	-	-	3	2	-	1	1	-	1	1	1	-	-	-	-	
August -	5,511	635	11.46	132	-	117	-	2	1	4	1	-	3	3	-	1	1	1	-	-	1	-	
September -	5,474	724	13.23	36	-	14	-	-	3	5	4	-	6	3	-	-	1	-	-	-	-	-	
October -	5,325	775	14.55	20	-	-	-	3	5	1	3	1	3	-	-	-	-	-	1	-	3	-	
November -	5,109	629	12.31	15	-	-	-	2	-	1	4	1	-	1	1	2	-	-	2	-	-	1	
December -	5,868	486	8.28	5	-	-	-	1	-	-	-	2	1	1	-	-	-	-	-	-	-	-	
						228	5	12	11	19	17	6	17	10	2	5	8	2	10	1	12	1	
Died per 1,000 of Average Strength.																							
	5,553	530	9.58	366	66.15	41.21	.90	2.17	1.99	3.44	3.07	1.08	3.07	1.80	.36	.90	1.44	.36	1.80	.18	2.17	.18	

DISEASES.	NUMBER OF ADMISSIONS INTO HOSPITAL IN EACH MONTH.												Total Admissions during the Year.	Admitted per Cent. of Average Strength.	Died Per Cent. of Admissions.
	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.			
Cholera -	-	-	-	-	-	2	169	147	14	2	-	-	334	6.04	68.26
Small-pox -	9	1	5	4	4	-	-	-	-	-	-	-	23	.41	21.74
Intermittent Fevers -	207	114	129	282	144	199	408	643	1,091	1,576	1,125	728	6,646	156.95	.48
Remittent Fevers -	3	9	2	27	15	12	66	175	147	93	23	2	574		
Continued Fevers -	34	13	73	206	125	89	194	174	189	258	89	20	1,464		
Dysentery -	15	11	8	15	10	15	33	53	58	46	24	30	318	5.75	7.23
Diarrhoea -	55	31	39	72	63	78	225	268	125	84	34	22	1,096	19.81	1.55
Hepatitis -	22	19	20	25	16	19	26	24	16	25	17	15	244	4.41	4.92
Ophthalmia -	55	49	47	62	29	25	25	33	30	26	7	12	400	7.23	-
Rheumatism -	58	40	49	32	33	44	43	42	44	55	43	48	531	9.60	-
Veneral Diseases -	178	211	185	227	188	160	191	104	100	129	108	152	1,933	34.94	-
Phthisis Pulmonalis -	4	1	-	-	1	3	3	2	6	3	3	1	27	.49	18.52
Heat Apoplexy -	-	-	-	3	4	5	2	2	1	-	-	-	17	.31	47.06
Delirium Tremens -	-	2	-	1	1	1	4	3	1	1	2	1	17	.31	11.80
Epilepsy -	1	2	1	4	2	2	6	1	2	1	-	1	23	.41	-
Respiratory Diseases -	62	51	47	60	46	41	41	27	32	40	52	39	538	9.72	1.86
Abscess and Ulcer -	25	65	33	51	41	61	44	40	23	33	29	25	470	8.49	-
Wounds and Accidents -	40	32	51	71	51	28	41	20	24	37	30	44	469	8.47	-
All other Diseases -	79	81	76	127	136	111	158	119	70	98	87	61	1,203	21.74	.27
	847	732	765	1,269	909	895	1,679	1,877	1,973	2,507	1,673	1,201	16,327		
Admitted per Cent. of Average Strength in each Month.															
	17.06	12.56	13.80	22.52	15.91	15.64	29.61	33.88	36.04	47.08	32.74	20.37	295.08		

TABLE showing the SICKNESS and MORTALITY among the EUROPEAN TROOPS serving in the Punjab during the Year 1861, and the prevalence of the principal Diseases in each Month of the Year.

MONTHS.	CAUSES OF DEATH.																						
	Average Strength.	Average Number daily Sick.	Daily Sick per Cent. of Average Strength.	Number of Deaths.	Died per 1,000 of Average Strength.	Cholera.	Small-pox.	Intermittent Fevers.	Remittent Fevers.	Continued Fevers.	Dysentery, Acute.	Dysentery, Chronic.	Diarrhoea.	Hepatitis, Acute.	Hepatitis, Chronic.	Phthisis Pulmonalis.	Heat Apoplexy.	Delirium Tremens.	Respiratory Diseases.	Heart Disease.	All other Diseases.	Wounds and Accidents.	
	January -	14,289	688	4·81	11	-	-	4	-	-	-	1	-	-	1	1	-	-	-	4	-	-	-
February -	15,474	805	5·20	16	-	-	1	-	-	1	1	2	-	2	2	-	-	-	4	-	3	-	
March -	15,718	875	5·56	10	-	-	3	-	-	1	1	-	-	1	1	-	-	-	1	1	1	-	
April -	16,593	1,039	6·26	19	-	-	-	-	-	2	1	-	1	1	4	3	1	-	2	3	1	-	
May -	16,612	1,173	7·07	25	-	-	-	3	1	1	5	-	-	2	-	-	4	2	-	4	-	-	
June -	16,625	1,149	6·91	26	-	-	2	1	1	1	2	-	2	-	-	3	5	-	3	2	3	1	
July -	16,692	1,117	6·69	27	-	6	-	-	1	1	7	-	-	3	1	3	1	-	1	1	2	-	
August -	16,592	1,203	7·25	495	-	473	-	1	-	2	3	-	5	1	1	2	4	-	-	1	-	-	
September -	16,156	1,384	8·56	125	-	94	-	1	2	6	1	1	4	5	-	2	6	-	-	-	3	-	
October -	15,706	1,144	7·28	32	-	1	-	2	-	3	2	2	3	5	2	3	1	-	1	1	5	1	
November -	15,314	907	5·92	18	-	-	-	-	-	2	3	1	1	4	1	2	-	1	-	1	2	-	
December -	15,027	779	5·18	14	-	-	-	1	-	1	-	2	-	3	4	1	1	-	1	-	-	-	
						574	13	9	5	21	27	8	16	28	17	19	23	3	17	10	26	2	
Died per 1,000 of Average Strength.																							
						15,900	1,022	6·43	818	51·45	36·10	·82	·57	·31	1·32	1·70	·50	1·01	1·76	1·07	1·20	1·45	·12

DISEASES.	NUMBER OF ADMISSIONS INTO HOSPITAL IN EACH MONTH.													Total Admissions during the Year.	Admitted per Cent. of Average Strength.	Died per Cent. of Admissions.							
	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.											
	Cholera -	-	1	-	-	-	2	10	757	128	-	2	-				900	5·66	63·80				
Small-pox -	23	8	6	8	7	6	2	-	-	-	1	1	62	·39	21·00								
Intermittent Fevers -	275	166	214	368	330	319	506	445	1,228	1,538	901	719	7,009	74·45	·29								
Remittent Fever -	21	9	10	32	46	119	120	177	920	163	19	6	1,642										
Continued Fevers -	42	71	110	385	437	305	395	491	497	313	108	32	3,186										
Dysentery -	33	36	43	49	56	57	60	88	81	70	47	44	664	4·11	5·27								
Diarrhoea -	62	45	59	185	246	183	322	420	268	162	84	99	2,135	13·43	·75								
Hepatitis -	53	63	49	86	77	77	87	56	54	78	56	48	784	4·93	5·74								
Ophthalmia -	65	71	93	140	62	55	56	57	54	85	35	88	861	5·42	-								
Rheumatism -	113	89	118	131	94	108	150	72	59	82	67	87	1,170	7·36	-								
Venereal Diseases -	346	359	352	590	392	351	406	274	237	408	331	423	4,469	28·10	-								
Phthisis Pulmonalis -	7	2	6	5	9	8	11	10	4	6	5	4	77	·49	24·67								
Heat Apoplexy -	-	-	-	1	6	11	10	7	9	1	-	-	45	·28	51·10								
Delirium Tremens -	5	1	1	2	4	7	6	4	2	6	4	3	45	·28	6·66								
Epilepsy -	3	2	1	2	4	4	4	7	4	3	2	3	39	·25	-								
Respiratory Diseases -	148	117	128	156	121	88	110	55	50	109	97	97	1,276	8·03	1·33								
Abscess and Ulcer -	96	141	93	150	188	204	250	147	135	131	110	116	1,761	11·08	-								
Wounds and Accidents -	136	115	122	142	119	102	115	79	104	119	116	176	1,445	9·09	-								
All other Diseases -	174	173	168	254	269	236	263	261	203	197	152	165	2,515	15·82	·31								
													30,085										
Admitted per Cent. of Average Strength in each Month.																							
						11·21	9·49	10·01	16·19	14·85	13·48	17·27	20·54	25·00	22·10	13·95	14·05	189·21					

COMPARATIVE STATEMENT of the Ratios of Sickness and Mortality among the European Troops serving in the various Provinces of the Bengal Presidency during the Year 1861.

	BENGAL PROPER.				DINAPORE, BENARES, AND OUDE.				CAWNPORE AND MEERUT.				AGRA AND CENTRAL INDIA.				PUNJAB.				BENGAL PRESIDENCY.				
	Average Strength	Daily Sick per Cent. of Strength	Admitted per Cent. of Strength	Died per 1,000 of Strength— A. From Cholera B. From all Causes	Average Strength	Daily Sick per Cent. of Strength	Admitted per Cent. of Average Strength	Died per 1,000 of Average Strength	Average Strength	Daily Sick per Cent. of Strength	Admitted per Cent. of Average Strength	Died per 1,000 of Average Strength	Average Strength	Daily Sick per Cent. of Strength	Admitted per Cent. of Average Strength	Died per 1,000 of Average Strength	Average Strength	Daily Sick per Cent. of Strength	Admitted per Cent. of Average Strength	Died per 1,000 of Average Strength	Average Strength	Daily Sick per Cent. of Strength	Admitted per Cent. of Average Strength	Died per 1,000 of Average Strength	
DISEASES.																									
Cholera	135	4.00	6.51	—	26	40.00	1.04	2.38	3.31	65.67	21.78	6.04	68.26	41.21	5.66	63.80	36.10	3.71	64.04	3.71	64.04	23.73	—	—	—
Small-pox	11	—	—	—	38	10.81	.41	—	1.05	20.00	2.08	.41	21.74	.90	.39	21.00	.82	.52	18.53	.52	18.53	.96	—	—	—
Fevers	58.80	.75	4.61	—	43.11	.53	2.27	—	51.03	1.18	6.04	156.95	.48	7.60	74.45	.29	2.20	71.52	.55	3.97	71.52	.55	—	—	—
Dysentery	15.13	5.20	7.86	—	5.81	4.10	2.38	—	7.60	6.51	4.96	5.75	7.23	4.15	4.11	5.27	2.20	6.55	5.62	3.67	6.55	5.62	—	—	—
Diarrhoea	25.59	.21	.54	—	8.94	.70	.62	—	19.08	1.76	3.36	19.81	1.55	3.07	13.43	.75	1.01	15.06	1.08	1.69	15.06	1.08	—	—	—
Hepatitis	4.85	7.82	3.79	—	6.32	4.26	2.69	—	8.43	3.75	3.17	4.41	4.92	2.16	4.93	5.74	2.83	6.04	4.80	2.89	6.04	4.80	—	—	—
Ophthalmia	6.97	—	—	—	6.16	—	—	—	7.81	—	—	7.23	—	—	5.42	—	—	6.57	—	—	6.57	—	—	—	—
Rheumatism	10.00	—	—	—	7.90	—	—	—	9.66	—	—	9.60	—	—	7.36	—	—	8.58	—	—	8.58	—	—	—	—
Veneral Diseases	29.08	—	—	—	38.40	—	—	—	51.58	—	—	34.04	—	—	28.10	—	—	36.91	—	—	36.91	—	—	—	—
Phthisis Pulmonalis	.65	25.00	1.62	—	.53	37.25	1.97	—	.92	25.81	2.37	.49	18.52	.90	.49	24.67	1.20	.68	27.03	.68	27.03	1.85	—	—	—
Heat Apoplexy	.19	57.14	1.08	—	.15	57.14	.84	—	.15	100.00	1.68	.31	47.06	1.44	.28	51.10	1.45	.22	61.22	.22	61.22	1.34	—	—	—
Delirium Tremens	1.11	4.90	.54	—	.47	17.40	.84	—	.41	12.20	.50	.31	11.80	.36	.28	6.66	.19	.46	9.75	.46	9.75	.45	—	—	—
Epilepsy	.68	—	—	—	.25	—	—	—	.46	—	—	.41	—	—	.25	—	—	.36	—	—	.36	—	—	—	—
Respiratory Diseases	7.67	1.06	.81	—	6.84	2.12	1.45	—	8.16	1.94	1.58	9.72	1.86	1.80	8.03	1.33	1.07	8.05	1.69	8.05	1.69	—	—	—	—
Abscess and Ulcer	12.09	—	—	—	11.71	—	—	—	12.82	—	—	8.49	—	—	11.08	—	—	11.46	—	—	11.46	—	—	—	—
Wounds and Accidents	9.30	—	—	—	7.13	—	—	—	9.03	—	—	8.47	—	—	9.09	—	—	8.65	—	—	8.65	—	—	—	—
All other Diseases	25.13	.28	2.71	—	16.64	.34	3.01	—	19.18	.27	2.77	21.74	.27	2.53	15.82	.31	2.38	18.63	.31	2.86	18.63	.31	—	—	—
	209.30	—	30.09	—	161.00	—	17.50	—	210.59	—	50.30	295.08	—	66.15	189.21	—	51.45	204.56	—	44.77	204.56	—	—	—	—

EUROPEAN TROOPS, 1861—continued.

TABLE showing the GENERAL STATISTICS of SICKNESS and MORTALITY in the Principal MILITARY STATIONS of the Bengal Presidency.

STATIONS.	Period of Observation.	Average Strength during Period of Observation.	DAILY SICK PER CENT. OF AVERAGE STRENGTH IN EACH MONTH.												Daily Sick per Cent. of Average Strength for the Year.	Number of Admissions into Hospital.	Admitted per Cent. of Average Strength.	NUMBER OF DEATHS.		DIED PER 1,000 OF AVERAGE STRENGTH.		
			Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.				A. Cholera.	B. All other Causes.	A. Cholera.	B. All other Causes.	C. All Causes.
Fort William	-	1,056	656	631	847	690	766	892	884	967	916	913	762	626	2,473	234.20	9	4	852	13.26	21.78	
Dum-Dum	-	803	669	676	621	614	868	1190	956	753	729	688	534	585	1,989	247.70	4	20	498	25.02	30.00	
Barrackpore	-	1,141	872	895	820	844	749	814	1240	1176	979	673	753	467	2,012	176.33	6	35	526	30.67	35.93	
Berhampore	-	275	919	804	583	431	332	439	505	432	445	719	606	699	511	185.82	-	6	-	21.82	21.82	
Sikkim Field Force	-	562	331	500	753	630	661	775	1067	740	777	846	536	400	555	104.10	-	19	-	33.81	33.81	
Hazareebaugh	-	846	1077	1774	1781	1700	1410	1347	1545	1242	928	745	738	575	2,142	253.20	15	-	1773	17.73	17.73	
Dinapore	-	783	416	600	380	475	548	560	777	915	930	644	455	506	1,435	183.27	2	16	255	20.45	23.00	
Benares	-	737	636	700	801	902	1273	1060	921	1141	1220	1007	700	433	1,711	232.16	2	13	271	17.64	20.35	
" Raj Ghat	-	160	761	652	1180	1226	1104	1227	1361	1000	1000	1111	400	1000	623	389.40	2	7	1250	43.75	56.25	
Gondakpore	-	907	672	572	740	842	937	955	921	922	968	785	637	619	1,501	165.49	-	18	-	19.85	19.85	
Gondak	-	921	526	359	451	800	911	901	946	1098	983	637	424	460	1,067	105.00	-	17	-	18.46	18.46	
Fyzabad	-	1,114	618	800	764	830	800	900	826	951	876	743	605	587	1,854	166.43	1	4	89	3.60	4.49	
Roy Bareilly	-	648	218	305	290	415	515	294	319	554	500	413	454	479	546	84.26	-	8	-	12.34	12.34	
Lucknow	-	2,215	696	684	614	700	751	722	696	833	793	681	600	650	3,089	139.45	3	28	135	12.65	14.00	
Seelapore	-	682	722	661	935	1205	1125	900	943	800	777	691	610	608	821	147.65	-	10	-	14.66	14.66	
Alahabad*	-	1,277	616	600	830	1067	1085	941	987	1093	1314	1167	859	901	3,127	244.87	21	40	1644	31.33	47.77	
Cawnpore	10 months, March to December	1,230	881	882	788	1070	1199	1020	1166	1322	1072	929	876	914	2,604	211.70	35	39	2845	31.71	60.16	
Fateelgaurh	-	434	-	-	650	550	757	804	1057	810	835	928	750	648	637	131.57	5	5	1152	11.52	23.04	
Bareilly	-	1,188	479	515	591	957	821	821	969	867	957	825	691	587	1,853	155.97	5	12	421	10.10	14.31	
Shahjahanpore	-	525	722	736	800	1276	960	621	700	682	740	722	717	553	700	86.10	2	11	436	23.96	28.32	
Moradabad	-	459	-	-	-	1319	1346	1240	1161	1166	1171	1132	1076	841	537	117.12	2	11	436	23.96	28.32	
Roorkee	-	588	470	414	440	370	561	879	682	950	874	701	524	573	1,076	183.00	1	4	170	6.80	8.50	
Meerut	-	2,535	614	678	792	950	766	830	934	1281	1184	1042	826	826	4,968	155.98	87	63	3432	24.85	59.17	
Delhi	-	1,127	1403	1312	1263	1074	1362	1280	1217	1246	1336	1300	1335	796	2,866	256.10	50	57	4436	50.58	94.94	
Muttra	-	347	878	973	833	994	1022	930	1165	934	845	723	646	592	529	236.02	4	4	1153	11.53	23.06	
Agra	-	1,220	709	671	600	530	881	861	1193	1707	2392	2700	1965	1068	4,489	367.94	69	35	5656	28.69	85.25	
Mor	-	1,106	1000	733	781	900	745	608	600	948	878	804	970	718	3,179	287.43	152	40	13743	41.59	179.02	
Jhansi.	-	623	542	784	737	844	787	650	1083	1314	1406	1672	1736	1090	1,921	398.35	26	20	3210	32.10	32.10	
Nowong	-	240	507	520	580	660	660	833	814	740	603	740	910	466	457	190.42	-	2	-	833	833	
Saugor	-	860	755	636	836	994	970	880	970	1017	1163	1330	745	561	529	236.02	-	8	-	530	530	
Nagode	-	203	735	737	760	802	750	837	943	850	973	700	754	464	2,125	247.10	-	8	-	1000	1000	
Jubbulpore	-	861	863	700	784	772	861	900	943	850	973	700	754	464	2,125	247.10	-	16	-	1858	1858	
Unbala	-	1,820	356	370	510	1077	1184	1114	1075	963	1142	691	521	450	4,637	254.80	53	30	2912	16.48	45.60	
Dugstale	-	1,055	-	-	-	474	416	387	482	519	502	323	-	-	433	36.02	9	9	-	853	853	
Sutaboo	7 months, April to October	1,019	-	-	-	782	1021	1041	894	780	660	606	544	-	1,161	102.84	-	19	-	1862	1862	
Jullundur	8 months, April to November	1,015	305	543	500	363	434	390	200	260	331	351	418	483	886	87.30	-	11	-	1084	1084	
Ferozepore	-	889	575	846	819	661	733	400	524	578	703	700	610	445	1,509	169.04	1	9	112	10.13	11.25	
Mean Meer	-	1,700	600	522	563	500	800	775	652	852	1172	1005	804	527	4,011	235.95	45	45	24563	45.64	291.17	
Unisur and Govindghur	-	481	466	441	425	520	502	503	538	742	1213	847	545	400	1,038	215.80	41	15	8524	31.18	116.42	
Mooltan	-	734	817	914	926	747	800	862	1072	1009	857	932	837	570	2,840	209.40	-	13	-	870	870	
Sealote	-	1,495	651	770	644	672	715	800	774	807	931	857	627	521	1,537	190.00	-	13	-	1771	1771	
Rawul Pindee	-	1,846	533	567	577	604	570	554	571	612	611	681	500	455	2,785	150.87	-	22	-	1190	1190	
Attock	11 months, January to Nov.	184	359	333	-	481	500	500	352	603	761	410	368	683	364	197.83	-	3	-	1630	1630	
Nowshera	-	805	-	-	364	372	431	451	451	562	663	645	936	-	1,321	164.10	-	5	-	621	621	
Campbellpore	7 months, May to November	339	393	440	364	-	265	400	471	646	414	314	270	-	254	74.92	-	2	-	600	600	
Peshawur	-	1,955	424	446	554	641	641	638	657	809	1531	1240	770	700	5,678	290.43	-	24	-	1227	1227	

* Exclusive of General Hospital.

EUROPEAN TROOPS, 1861—continued.

TABLE showing the Ratio in which the Principal DISEASES have contributed to make up the ADMISSION RATE of the Year in the CHIEF MILITARY STATIONS of the Bengal Presidency.

STATIONS.	ADMITTED INTO HOSPITAL PER CENT. OF AVERAGE STRENGTH.												Admitted per Cent. of Average Strength from all Causes.
	Average Strength.	Cholera.	Heat Apoplexy.	Fevers.	Dysentery.	Diarrhoea.	Hepatitis.	Ophthalmia.	Rheumatism.	Veneral Diseases.	Diseases of the Respiratory Organs.	All other Causes.	
Fort William - -	1,056	1.70	-	63.45	10.99	30.59	5.50	11.84	12.60	39.20	6.53	51.80	234.20
Am-Dum - -	803	1.37	.25	65.13	17.68	29.52	5.60	7.85	12.33	31.13	11.83	65.01	247.70
Arrackpore - -	1,141	1.14	.26	44.34	22.88	25.77	4.47	1.49	8.85	23.66	7.10	36.37	176.33
Beceegunge (9 months)	186	3.23	1.08	26.35	7.53	8.60	2.69	6.45	4.30	46.77	3.23	42.47	152.70
Barrackpore - -	275	-	-	119.28	2.55	8.00	3.63	12.36	3.63	4.73	4.36	27.28	185.82
Bikim Field Force -	562	-	.18	24.20	4.80	10.14	4.99	1.60	8.90	14.95	8.54	25.80	104.10
Bazareebaugh - -	846	.35	.12	98.58	3.43	16.08	3.31	9.81	9.57	63.46	10.76	37.71	255.20
Banapore - -	783	.38	.13	48.79	7.28	12.01	4.72	6.90	4.72	52.87	9.97	35.50	183.27
Banars - -	737	.13	.41	72.73	10.72	6.38	14.38	6.11	8.41	59.70	6.51	46.68	232.16
„ Raj Ghat -	160	1.88	.63	196.88	14.37	21.88	10.63	2.50	9.38	58.12	11.88	61.25	389.40
Barrackpore - -	907	-	-	47.08	11.02	8.82	2.76	4.63	10.48	38.92	6.06	35.72	165.49
Bondah - -	921	.11	-	14.44	3.80	5.10	8.15	2.82	7.60	22.70	5.21	35.07	105.00
Buzabad - -	1,114	.45	-	28.63	3.41	8.89	7.81	9.16	6.10	46.59	8.89	46.50	166.43
Coy Bareilly - -	648	-	-	22.07	2.01	3.40	2.16	3.24	4.78	26.08	2.62	17.90	84.26
Cucknow - -	2,215	.40	.18	34.63	5.78	8.39	6.91	6.09	7.13	26.73	4.20	39.01	139.45
Cetapore - -	682	-	.29	21.55	4.40	7.48	4.54	9.53	13.95	42.67	8.94	34.90	147.65
Chahabad - -	1,277	2.51	.16	79.80	6.97	31.09	14.95	7.67	9.01	39.62	13.31	39.78	244.87
Cannanore - -	1,230	3.90	.08	54.23	9.02	16.91	4.23	6.99	8.13	54.80	4.96	48.45	211.70
Cuttahgurh (10 months)	434	2.53	.23	21.20	3.91	5.30	4.38	5.30	1.15	48.62	3.69	35.26	131.57
Chahjehanpore (9 „)	525	-	-	19.43	.95	3.05	1.90	4.57	4.00	27.62	2.10	22.48	86.10
Careilly - -	1,188	.34	.08	30.64	4.54	8.08	6.73	7.83	10.44	51.09	7.16	29.04	155.97
Corabad (9 months)	459	.44	-	18.84	2.83	5.45	3.50	6.32	13.07	30.72	5.23	30.72	117.12
Coorkee - -	588	.17	.17	44.90	7.14	13.95	4.93	6.80	7.82	37.59	6.30	53.23	183.00
Ceerut - -	2,535	4.65	.32	42.68	6.50	22.37	6.24	4.38	8.52	51.44	9.04	39.84	195.98
Celhi - -	1,127	7.45	-	70.66	13.66	24.76	5.77	11.98	6.30	65.60	4.52	39.40	256.10
Cuttara - -	347	5.48	-	55.32	2.60	15.85	18.16	3.46	7.20	48.99	6.34	75.50	238.90
Cogra - -	1,220	9.34	.41	217.62	9.59	31.07	4.26	3.36	6.72	43.77	11.64	30.16	367.94
Corar - -	1,106	18.99	.45	148.73	2.90	23.60	2.62	4.52	4.43	30.11	10.03	41.05	287.43
Cwalior Fortress -	244	3.28	-	42.62	6.98	8.20	3.28	13.92	7.37	21.72	1.64	26.64	135.65
Cansi - -	623	-	.80	181.22	12.20	13.80	6.26	11.55	10.44	27.30	10.11	34.67	308.35
Cullulpore (11 months)	192	-	-	312.50	8.33	25.52	5.21	23.44	7.29	36.98	11.98	100.00	531.25
Cowgong - -	240	-	.83	96.25	2.08	10.83	5.83	5.00	4.59	21.59	4.17	36.25	190.42
Caugor - -	860	-	-	94.30	3.95	10.35	4.77	9.89	14.54	49.07	8.37	51.86	247.10
Cagode - -	203	.50	-	128.57	.50	5.42	1.97	5.42	10.35	29.51	5.92	34.00	222.16
Cabbulpore - -	861	.12	-	144.94	2.33	20.55	5.46	5.81	16.92	26.83	11.73	23.91	273.40
Camballa - -	1,820	3.90	.06	99.45	5.50	25.60	3.35	8.35	9.23	49.51	7.59	42.26	254.80
Cugshaie (7 months)	1,055	-	-	5.12	.67	7.58	2.08	2.28	1.90	5.98	3.12	7.29	36.02
Cubathoo (8 „)	1,019	-	-	15.31	6.97	26.20	3.33	8.21	5.30	13.15	3.83	20.51	102.84
Cullundur - -	1,015	.09	-	16.17	1.48	3.74	1.87	2.96	1.87	34.69	4.04	20.39	87.30
Cerozepore - -	889	.45	.11	43.42	1.69	11.14	3.26	2.70	13.50	46.34	7.76	39.27	169.64
Ceean Meer - -	1,700	42.65	.82	73.77	4.65	16.88	5.77	7.82	5.76	23.89	8.17	45.47	235.95
Covindegurh & Umritsur	481	10.39	.20	92.31	6.03	21.21	3.33	3.75	11.23	24.74	6.44	36.17	215.80
Cooltan - -	734	-	1.77	56.54	6.40	8.59	13.21	4.63	7.22	41.36	8.04	61.44	209.40
Cealkote - -	1,495	.07	.12	81.87	1.54	4.28	4.21	8.00	4.55	33.79	10.37	41.20	190.00
Cawal Pindee - -	1,846	-	-	44.36	1.57	7.15	7.21	2.82	11.81	21.45	14.68	39.82	150.87
Campbellpore (7 months)	339	-	-	22.13	2.07	5.01	1.18	.30	2.36	15.34	3.83	22.70	74.92
Cattock - -	184	-	-	97.82	15.22	9.80	11.95	1.63	5.98	14.13	2.71	38.59	197.83
Cowshera (11 months)	805	-	.37	72.92	8.70	6.58	4.97	2.86	7.58	11.55	5.59	42.98	164.10
Ceshawur - -	1,955	.10	.36	192.12	5.52	15.75	2.81	2.81	5.52	22.61	7.93	31.90	290.43

EUROPEAN TROOPS, 1861—*continued.*

TABLE showing the Prevalence of SMALL POX in each Month, and the Distribution of the DISEASE by STATIONS and PROVINCES.

STATIONS.	Average Strength for the period of Occupation.	NUMBER OF ADMISSIONS INTO HOSPITAL IN EACH MONTH.												Total Admissions.	Admitted per Cent. of Average Strength.	Number of Deaths.	Died per 1,000 of Average Strength.
		Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.				
Presidency Hospitals - - -	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Fort William - - - -	1,056	4	-	-	-	-	-	-	-	-	-	-	-	4	-	-	-
Dum-Dum - - - -	803	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Barrackpore - - - -	1,141	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cbinsurah Depôt - - -	204	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Raneegunge Depôt - - -	140	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Berhampore - - - -	275	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Debroogurh - - - -	70	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	3,689	4	-	-	-	-	-	-	-	-	-	-	-	4	11	-	-
Darjeeling Depôt - - -	80	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sikkim Field Force - - -	562	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hazareebaugh - - - -	846	2	-	2	2	-	-	-	-	-	-	-	-	6	-	-	-
Dinapore - - - -	783	-	-	1	-	-	-	-	-	-	-	-	-	1	-	-	-
Benares - - - -	737	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
„ Raj Ghat - - - -	160	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Goruckpore - - - -	907	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Goudah - - - -	921	-	-	-	1	-	-	-	-	-	-	-	-	1	-	-	-
Fyzabad - - - -	1,114	1	-	-	-	-	-	-	-	-	-	-	-	1	-	1	-
Rae Bareilly - - - -	648	-	-	-	3	1	-	-	-	-	-	-	-	4	-	1	-
Lucknow - - - -	2,215	-	-	4	4	5	-	-	-	-	-	-	-	13	-	1	-
Seetapore - - - -	682	2	2	5	1	1	-	-	-	-	-	-	-	11	-	1	-
	9,655	5	2	12	11	7	-	-	-	-	-	-	-	37	38	4	41
Allahabad - - - -	1,277	-	2	10	3	2	-	-	-	-	-	-	-	17	-	4	-
„ General Hospital - -	113	-	6	1	-	2	-	-	-	-	-	-	-	9	-	1	-
Cawnpore - - - -	1,230	2	2	5	14	6	2	1	-	-	-	-	-	32	-	5	-
Futtehgurh (10 months) -	434	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bareilly - - - -	1,188	-	-	1	3	-	-	-	-	-	-	-	-	4	-	1	-
Shahjehanpore (9 months) -	525	-	1	-	2	-	-	-	-	-	-	-	-	3	-	-	-
Moradabad (9 months) - -	459	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Nynee Tal Depôt - - -	310	-	-	-	3	-	-	-	-	-	-	-	-	3	-	2	-
Landour Depôt - - - -	132	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Roorkee - - - -	588	-	-	-	2	-	-	-	-	-	-	-	-	2	-	-	-
Meerut - - - -	2,535	5	4	4	12	1	-	-	-	-	-	-	-	26	-	7	-
Delhi - - - -	1,127	-	-	3	6	1	-	-	-	-	-	-	-	10	-	1	-
Muttra - - - -	347	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	10,102	7	15	24	45	12	2	1	-	-	-	-	-	106	105	21	208
Agra - - - -	1,220	-	1	3	4	2	-	-	-	-	-	-	-	10	-	1	-
Morar - - - -	1,106	5	-	-	-	-	-	-	-	-	-	-	-	5	-	3	-
Gwalior Citadel - - - -	244	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-
Jhansi - - - -	623	4	-	-	-	-	-	-	-	-	-	-	-	4	-	-	-
Lullupore - - - -	176	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Nowgong - - - -	240	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Saugor - - - -	860	-	-	1	-	2	-	-	-	-	-	-	-	3	-	-	-
Nagode - - - -	203	-	-	1	-	-	-	-	-	-	-	-	-	1	-	-	-
Jubbulpore - - - -	861	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	5,533	9	1	5	4	4	-	-	-	-	-	-	-	23	41	5	90
Umballa - - - -	1,820	13	3	5	3	1	-	-	-	-	-	-	-	25	-	5	-
Dugshaie (7 months) - -	1,055	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Subathoo (8 months) - -	1,019	2	-	-	1	-	-	-	-	-	-	-	-	3	-	-	-
Kussowlie Depôt - - -	223	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Jutogh - - - -	35	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Phillour - - - -	125	2	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-
Jullundur - - - -	1,015	-	1	-	-	1	-	-	-	-	-	-	-	2	-	1	-
Ferozepore - - - -	889	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Meean Meer - - - -	1,700	3	-	-	3	3	2	-	-	-	-	-	-	11	-	3	-
Lahore Citadel - - - -	149	-	-	-	-	2	-	-	-	-	-	-	-	2	-	-	-
Umritsur and Govindghur -	481	-	-	-	1	-	1	1	-	-	-	-	-	3	-	-	-
Mooltan - - - -	734	1	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-
Dera Ismael Khan - - -	106	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sealkote - - - -	1,495	1	2	1	-	-	1	-	-	-	-	-	-	5	-	1	-
Kangra - - - -	98	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Rawul Pindee - - - -	1,846	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-
Attock - - - -	184	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Nowshera (11 months) - -	805	1	2	-	-	-	1	-	-	-	-	-	-	4	-	2	-
Campbellpore (7 months) -	339	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Peshawur - - - -	1,955	-	-	-	-	-	1	1	-	-	-	1	1	4	-	-	-
Murree Depôt - - - -	229	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	15,900	23	8	6	8	7	6	2	-	-	-	1	1	62	39	13	82
BENGAL PRESIDENCY - - -	44,879	48	26	47	68	30	8	3	-	-	-	1	1	232	52	43	96

EUROPEAN TROOPS, 1861—continued.

TABLE showing the PREVALENCE of CHOLERA in each Month, and the Distribution of the DISEASE by STATIONS and PROVINCES.

STATIONS.	Average Strength for the Period of Occupation.	Number of Admissions into Hospital in each Month.												Total Admissions.	Admitted per Cent. of Average Strength.	Number of Deaths.	Died Per 1,000, of Average Strength.
		January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.				
Presidency Hospitals	-	1	1	5	7	4	-	-	-	-	1	-	-	19	-	9	-
Fort William	1,056	3	2	8	2	3	-	-	-	-	-	-	-	18	-	9	-
Dum-Dum	803	-	-	5	6	-	-	-	-	-	-	-	-	11	-	4	-
Barrackpore	1,141	1	1	3	1	3	3	1	-	-	-	-	-	13	-	6	-
Chinsurah Depôt	204	-	-	-	2	-	-	-	-	-	-	-	-	2	-	2	-
Raneegunge Depôt	140	-	-	-	4	-	-	-	-	-	2	-	-	6	-	3	-
Berhampore	275	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Debroogurh	70	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	3,689	4	3	16	15	6	3	1	-	-	2	-	-	50	1.35	24	6.51
Darjeeling Depôt	80	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sikkim Field Force	562	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hazareebaugh	846	1	-	-	-	-	-	2	-	-	-	-	-	3	-	-	-
Dinapore	783	-	-	-	2	-	-	-	-	-	-	-	1	3	-	2	-
Benares	737	-	-	-	-	-	-	-	1	-	-	-	-	1	-	1	-
Benares Rajghat	160	-	-	-	-	-	-	-	2	1	-	-	-	3	-	3	-
Goruckpore	907	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Gondah	921	-	-	-	1	-	-	-	-	-	-	-	-	1	-	-	-
Fyzabad	1,114	-	-	-	-	-	3	-	-	2	-	-	-	5	-	1	-
Rae Bareilly	648	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Lucknow	2,215	-	-	-	1	-	-	2	6	-	-	-	-	9	-	3	-
Seetapore	682	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	9,655	1	-	-	4	-	3	4	9	3	-	-	1	25	2.26	10	1.04
Allahabad	1,277	-	-	-	-	4	2	20	4	-	2	-	-	32	-	21	-
Allahabad, General Hospital	113	-	-	-	1	1	-	5	8	-	1	-	-	16	-	10	-
Cawnpore	1,230	-	-	1	-	8	9	10	19	-	-	1	-	48	-	35	-
Futtehgurh (10 months)	434	-	-	-	-	-	-	-	11	-	-	-	-	11	-	5	-
Bareilly	1,188	-	-	-	-	-	-	-	1	3	-	-	-	4	-	5	-
Shahjehanpore (9 months)	525	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-
Moradabad (9 months)	459	-	-	-	-	-	1	1	-	-	-	-	-	2	-	2	-
Nynsee Tal	310	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Landour	132	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Roorkee	588	-	-	-	-	-	-	-	1	-	-	-	-	1	-	1	-
Meerut	2,535	-	-	-	1	1	-	88	27	-	1	-	-	118	-	87	-
Delhi	1,127	-	-	1	1	-	-	81	1	-	-	-	-	84	-	50	-
Muttra	347	-	-	-	-	-	-	10	9	-	-	-	-	19	-	4	-
	10,102	-	-	2	3	14	11	215	82	3	3	2	-	335	3.31	220	21.78
Agra	1,220	-	-	-	-	-	1	103	8	1	1	-	-	114	-	69	-
Morar	1,105	-	-	-	-	-	-	64	133	13	-	-	-	210	-	152	-
Gwalior Citadel	244	-	-	-	-	-	-	2	6	-	-	-	-	8	-	7	-
Jhansi	623	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Lullutpore	176	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Nowgong	240	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Saugor	860	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Nagode	203	-	-	-	-	-	1	-	-	-	-	-	-	1	-	-	-
Jubbulpore	861	-	-	-	-	-	-	-	-	-	1	-	-	1	-	-	-
	5,533	-	-	-	-	-	2	169	147	14	2	-	-	334	6.04	228	41.21
Umballa	1,820	-	-	-	-	-	-	10	57	4	-	-	-	71	-	53	-
Dugshaie (7 months)	1,055	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Subathoo (8 months)	1,019	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Kussowlie	223	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Futogh	35	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Phillour	125	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Jullundur	1,015	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ferozepore	889	-	-	-	-	-	-	-	-	2	-	2	-	1	-	-	-
Meeran Meer	1,700	-	-	-	-	-	-	-	661	64	-	-	-	4	-	-	-
Lahore Citadel	149	-	-	-	-	-	-	-	39	7	-	-	-	725	-	450	-
Jmrirtsur and Govindghur	481	-	-	-	-	-	-	-	-	50	-	-	-	46	-	29	-
Mooltan	734	-	-	-	-	-	-	-	-	-	-	-	-	50	-	41	-
Dera Ismael Khan	106	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sealkote	1,494	-	-	-	-	-	1	-	-	-	-	-	-	1	-	-	-
Kangra	98	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Rawul Pindee	1,846	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Attock	184	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Nowshera (11 months)	805	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Campbellpore (7 months)	339	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Peshawur	1,955	-	-	-	-	-	1	-	-	1	-	-	-	2	-	-	-
Murree	229	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	15,900	-	1	-	-	-	2	10	757	128	-	2	-	900	5.66	574	36.10
BENGAL PRESIDENCY	44,879	6	5	23	29	24	21	399	995	148	8	4	1	1,663	3.71	1,065	23.73

EUROPEAN TROOPS, 1861—continued.

TABLE showing the MORTALITY in each STATION, the CAUSES of DEATH, and the Ratio of DEATHS to STRENGTH.

STATIONS.	Average Strength for the Period of Occupation.	CAUSES OF DEATHS IN HOSPITAL.																	Number of Deaths.	Died per 1,000 of Average Strength.		
		Cholera.	Small-pox.	Intermittent Fevers.	Remittent Fevers.	Continued Fevers.	Dysentery, Acute.	Dysentery, Chronic.	Diarrhoea.	Hepatitis, Acute.	Hepatitis, Chronic.	Phthisis Pulmonalis.	Heat Apoplexy.	Delirium Tremens.	Respiratory Diseases.	Heart Diseases.	All other Diseases.	Wounds and Accidents.		A. Cholera.	B. Other Causes.	C. All Causes.
Presidency Hospitals	-	9	-	-	-	1	5	-	1	-	1	10	-	-	1	1	8	-	37	-	-	-
Fort William	1,056	9	-	-	1	-	4	-	-	4	1	1	-	-	1	1	1	-	23	8.52	13.26	21.78
Dum-Dum	803	4	-	-	3	3	-	1	2	3	-	2	2	2	-	-	2	-	24	4.98	25.02	30.00
Barrackpore	1,141	6	-	-	-	2	14	6	-	1	1	3	2	-	1	1	4	-	41	5.26	30.67	35.93
Chinsurah Depôt	204	2	-	-	-	-	1	-	-	-	-	-	-	-	1	-	-	-	4	-	-	-
Raneegunge Depôt	140	3	-	-	-	1	2	-	-	2	-	-	-	-	-	1	-	-	9	16.13	32.26	48.39
Berhampore	275	-	-	-	-	3	1	-	-	1	1	-	-	-	-	-	-	-	6	-	21.82	21.82
Debrooghur	70	-	-	-	3	1	-	-	-	-	-	-	-	-	-	-	-	-	4	-	52.63	52.63
	3,689	24	-	-	7	10	22	7	2	11	3	6	4	2	3	3	7	-	111	6.51	23.58	30.09
Darjeeling Depôt	80	-	-	-	-	-	-	-	-	1	-	1	1	-	1	-	-	-	4	-	-	-
Darjeeling and Sikkim Field Force.	562	-	-	-	-	1	3	-	-	4	-	3	-	1	3	-	3	1	19	-	33.81	33.81
Hazareebaugh	846	-	-	1	5	-	1	-	-	3	-	1	-	-	-	-	4	-	15	-	17.73	17.73
Dinapore	783	2	-	-	-	2	2	-	4	3	-	1	2	1	1	-	1	-	18	2.55	20.45	23.00
Benares	737	2	-	-	1	-	3	1	1	1	1	2	1	1	1	-	-	-	15	2.71	17.64	20.35
Benares Rajghat	160	2	-	-	-	-	2	-	-	-	-	-	1	2	1	1	-	-	9	12.50	43.75	56.25
Goruckpore	907	-	-	-	-	1	4	-	-	2	-	1	1	-	4	-	5	-	18	-	19.85	19.85
Gondah	921	-	-	-	4	-	1	-	1	1	-	1	-	1	4	-	3	1	17	-	18.46	18.46
Fyzabad	1,114	1	1	-	-	-	-	-	-	-	2	1	-	-	-	-	-	-	5	8.9	3.60	4.49
Rae Bareilly	648	-	1	1	2	-	1	-	-	1	1	-	-	-	-	-	1	-	8	-	12.34	12.34
Lucknow	2,215	3	1	1	-	2	2	-	-	4	1	8	1	-	-	-	8	-	31	1.35	12.65	14.00
Seetapore	682	-	1	1	-	-	2	1	-	-	1	-	1	2	-	1	-	-	10	-	14.66	14.66
	9,655	10	4	4	12	6	21	2	6	20	6	19	8	8	14	2	25	2	169	1.04	16.46	17.50
Allahabad	1,277	21	4	-	1	9	2	2	2	4	2	4	4	1	-	1	3	1	61	16.44	31.33	47.77
Allahabad General Hospital	113	10	1	-	-	1	1	3	-	-	2	1	1	-	-	-	5	-	25	-	-	-
Cawnpore	1,230	35	5	4	3	-	10	1	6	3	-	2	-	1	2	-	2	-	74	28.45	31.71	60.16
Futtehgurh (10 months)	434	5	-	-	-	-	1	-	-	1	-	-	1	-	2	-	-	-	10	11.52	11.52	23.04
Bareilly	1,188	5	1	1	1	-	1	-	1	3	-	-	2	1	-	-	1	-	17	4.21	10.10	14.31
Shahjehanpore (9 months)	525	-	-	-	-	1	-	-	-	1	-	1	-	-	1	-	-	-	4	-	7.62	7.62
Moradabad (9 months)	459	2	-	-	-	-	-	1	-	2	-	2	1	-	2	1	2	-	13	4.36	23.96	28.32
Nynee Tal (8 months)	416	-	2	-	-	-	-	-	2	-	-	2	-	-	3	-	4	-	13	-	-	-
Landour (8 months)	207	-	-	2	-	-	-	1	5	-	7	2	-	-	2	1	1	-	21	-	-	-
Roorkee	588	1	-	-	1	1	1	-	-	-	-	-	-	-	-	1	-	-	5	1.70	6.80	8.50
Meerut	2,535	87	7	-	4	16	5	1	6	4	2	6	5	1	3	1	1	1	150	34.32	24.85	59.17
Delhi	1,127	50	1	2	6	7	20	-	11	1	-	3	3	-	1	-	2	-	107	44.36	50.58	94.94
Muttra	347	4	-	-	1	-	-	-	-	-	-	1	-	-	-	-	-	-	8	11.53	11.53	23.06
	10,102	220	21	9	17	35	41	9	34	19	13	24	17	5	16	4	22	2	508	21.78	28.52	50.30
Agra	1,220	69	1	3	7	3	5	2	1	3	-	1	4	1	2	-	2	-	104	56.56	28.69	85.25
Morar	1,106	152	3	2	1	6	3	3	12	3	1	-	3	1	6	-	1	1	198	137.43	41.59	179.02
Gwalior Citadel	244	7	1	-	-	-	-	-	-	1	-	1	-	-	-	-	-	-	10	28.69	12.31	41.00
Jhansi	623	-	-	-	1	4	6	-	1	1	-	2	1	-	1	-	3	-	20	-	32.10	32.10
Lulliatpore	176	-	-	1	-	1	1	1	-	-	-	-	-	-	-	-	2	-	6	-	31.25	31.25
Nowgong	240	-	-	-	1	-	-	-	-	-	1	-	-	-	-	-	-	-	2	-	8.33	8.33
Saugor	860	-	-	-	1	2	1	-	-	1	-	1	-	-	1	1	-	-	8	-	9.30	9.30
Nagode	203	-	-	1	-	-	-	-	-	1	-	-	-	-	-	-	-	-	2	-	10.00	10.00
Jubbulpore	861	-	-	5	-	3	1	-	3	-	-	-	-	-	-	-	4	-	16	-	18.58	18.58
	5,533	228	5	12	11	19	17	6	17	10	2	5	8	2	10	1	12	1	366	41.21	24.94	66.15
Umballa	1,820	53	5	1	1	1	1	2	1	6	3	1	1	1	3	1	2	-	83	29.12	16.48	45.60
Dugshaie (7 months)	1,055	-	-	-	-	-	1	2	1	1	-	-	-	-	2	1	1	-	9	-	8.53	8.53
Subathoo (8 months)	1,019	-	-	-	-	3	9	-	1	1	1	-	-	-	-	-	4	-	19	-	18.62	18.62
Kussowlie	223	-	-	-	-	-	-	-	2	-	2	-	-	-	-	1	6	-	13	-	-	-
Jutogh	35	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Phillour	125	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Jullundur	1,015	-	1	-	-	1	2	-	-	1	1	2	-	-	-	1	2	-	11	-	10.84	10.84
Ferozepore	889	1	-	-	-	1	-	-	1	2	-	-	2	-	-	1	2	-	10	1.12	10.13	11.25
Meeran Meer	1,700	450	3	4	3	4	3	1	3	5	4	3	5	-	3	1	2	1	495	245.63	45.54	291.17
Lahore Citadel	149	29	-	-	-	-	-	-	-	-	-	-	2	-	-	1	-	-	32	177.91	18.40	196.31
Umritsur and Govindghur	481	41	-	2	-	1	2	1	3	1	2	2	1	-	-	-	-	-	56	85.24	31.18	116.42
Mooltan	734	-	-	-	-	1	-	1	-	1	-	1	6	-	-	-	3	-	13	-	17.71	17.71
Dera Ismael Khan	106	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sealkote	1,495	-	1	2	-	-	2	-	-	3	-	1	1	-	2	-	1	-	13	-	8.70	8.70
Kangra	98	-	-	-	-	-	-	-	-	-	-	1	-	-	-	1	-	-	2	-	20.41	20.41
Rawul Pindee	1,846	-	1	-	-	4	2	-	1	3	1	3	-	-	5	1	-	1	22	-	11.90	11.90
Attock	184	-	-	-	-	-	-	2	-	-	-	-	1	-	-	-	-	-	3	-	16.30	16.30
Nowshera (11 months)	805	-	2	-	1	-	1	-	-	-	-	-	1	-	-	-	-	-	5	-	6.21	6.21
Campbellpore (7 months)	339	-	-	-	-	-	-	-	-	1	-	-	1	-	-	-	-	-	2	-	6.00	6.00
Peshawur	1,955	-	-	-	-	5	4	-	1	3	1	2	2	2	-	2	2	-	24	-	12.27	12.27
Murree	229	-	-	-	-	-	-	-	1	-	2	1	-	-	-	-	-	-	6	-	-	-
	15,900	574	13	9	5	21	27	8	16	28	17	19	23	3	17	10	26	2	818	36.10	15.35	51.45
BENGAL PRESIDENCY	44,879	1,065	43	34	52	92	133	32	76	88	42	83	60	20	61	21	100	7	2,009	23.73	21.04	44.77

EUROPEAN TROOPS, 1861—continued.

TABLE showing the CAUSES of DEATH and INVALIDING.

TOTAL LOSS TO THE SERVICE BY DEATH AND INVALIDING, 3,322. PER 1,000 OF AVERAGE STRENGTH, 74.02.

Number of Men Lost to the Service by Death, 2,062.				Number of Men Lost to the Service by Invaliding, 1,260.			
CAUSES OF DEATH.	Died in Hospital.	Died out of Hospital.	Died per 1,000 of Strength.	CAUSES OF INVALIDING.	Invalided for Discharge from the Service.	Invalided for Change of Climate.	Invalided per 1,000 of Strength.
Variola - - - -	43	-	·96	Febris - - - -	26	62	1.96
Tonsillitis - - -	1	-	-	Ophthalmia - - -	51	37	1.96
Scarlatina - - -	2	-	-	Erysipelas - - -	-	1	-
Febris Intermittens -	34	-	·76	Furunculus - - -	-	1	-
„ Remittens - - -	52	-	1.16	Dysentery - - - -	20	53	2.54
„ Continua - - -	92	-	2.05	Diarrhoea - - - -	6	35	
Erysipelas - - -	3	-	-	Rheumatismus - -	83	88	3.81
Dysentery Acuta - -	133	-	3.67	Syphilis - - - -	12	29	.98
„ Chronica - - -	32	-		Stricture Urethrae -	2	1	
Diarrhoea - - - -	76	-	1.69	Ebriositas - - - -	-	1	-
Cholera - - - -	1,065	-	23.73	Scirrhus - - - -	-	1	-
Rheumatismus - - -	5	-	-	Scrofula - - - -	13	6	-
Syphilis Consecutiva	18	-	-	Phthisis Pulmonalis	31	30	1.56
Hydrophobia - - -	3	-	-	Hæmoptysis - - - -	4	5	
Ebriositas - - - -	1	4	-	Apoplexia - - - -	2	2	-
Anæmia - - - -	3	-	-	Paralysis - - - -	12	4	-
Anasarca - - - -	2	-	-	Mania - - - -	9	1	.60
Scirrhus - - - -	3	-	-	Dementia - - - -	10	7	
Phthisis Pulmonalis	83	-	1.85	Epilepsia - - - -	15	5	.45
Hæmoptysis - - - -	3	-	-	Cephalæa - - - -	2	8	
Abscessus Psoanus -	3	-	-	Neuralgia - - - -	2	1	-
Meningitis - - - -	4	-	-	Otitis - - - -	1	-	-
Encephalitis - - -	5	-	-	Dysæcia - - - -	9	-	-
Apoplexia - - - -	60	1	1.34	Sciatica - - - -	1	-	-
Paralysis - - - -	4	-	-	Amaurosis - - - -	1	1	-
Mania - - - -	2	-	-	Pericarditis - - -	1	-	-
Epilepsia - - - -	4	-	.45	Morbus Cordis - - -	18	25	1.49
Delirium Tremens -	20	-	-	Aneurisma - - - -	2	-	
Pericarditis - - -	1	-	.47	Palpitation - - - -	13	8	-
Morbus Cordis - - -	13	-		Varix - - - -	8	3	
Aneurisma - - - -	7	-	-	Bronchitis - - - -	26	25	-
Laryngitis - - - -	1	-	-	Pleuritis - - - -	-	2	
Bronchitis - - - -	17	-	-	Pneumonia - - - -	-	2	1.34
Pneumonia - - - -	34	-	1.36	Asthma - - - -	3	1	
Pleuritis - - - -	3	-	-	Dyspnoea - - - -	1	-	-
Hydrothorax - - -	1	-	-	Hernia - - - -	9	-	-
Apoplexia Pulmonum	1	-	-	Dyspepsia - - - -	5	7	-
Asthma - - - -	1	-	-	Hæmorrhoids - - - -	1	-	-
Dyspepsia - - - -	1	-	-	Fistula in ano - - -	-	1	-
Gastritis - - - -	5	-	-	Splenitis - - - -	1	7	-
Enteritis - - - -	2	-	-	Hepatitis - - - -	49	122	3.81
Colica - - - -	2	-	-	Icterus - - - -	-	1	-
Peritonitis - - - -	6	-	-	Ascites - - - -	-	3	-
Ascites - - - -	2	-	-	Nephritis - - - -	4	1	-
Splenitis - - - -	1	-	-	Enuresis - - - -	1	-	-
Hepatitis Acuta - -	88	-	2.89	Orchitis - - - -	-	5	-
„ Chronica - - -	42	-		Contractura - - - -	6	2	-
Icterus - - - -	1	-	-	Synovitis - - - -	-	4	-
Melæna - - - -	1	-	-	Ostitis - - - -	2	-	-
Nephria - - - -	4	-	-	Caries - - - -	-	3	-
Albumenuria - - -	2	-	-	Exostosis - - - -	1	3	-
Ischuria - - - -	1	-	-	Morbus Coxæ - - -	1	-	-
Stricture Urethrae -	1	-	-	Morbi Cutis - - - -	1	2	-
Abscessus - - - -	2	-	-	Paronychia - - - -	1	1	-
Asthenia - - - -	2	-	-	Abscessus - - - -	-	3	-
Atrophia - - - -	4	-	-	Ulcus - - - -	3	7	-
Gunshot wound - -	2	-	-	Debilitas (worn out)	81	38	2.65
Amputation - - - -	1	-	-	Ambustio - - - -	-	1	-
Accident - - - -	3	4	-	Luxation - - - -	1	1	-
Suffocation - - - -	-	2	-	Subluxatio - - - -	1	1	-
Drowning - - - -	-	28	1.23	Fractura - - - -	4	5	.80
Murder - - - -	-	1	-	Contusio - - - -	3	3	
Homicide - - - -	1	-	-	Concussio Cerebri -	-	1	-
Suicide - - - -	-	12	-	Vulnus - - - -	12	1	-
Execution - - - -	-	1	-	Amputatio - - - -	2	-	-
				Not specified - - -	8	11	-
Ratio per 1,000 for Deaths from causes not specially calculated - - -	-	-	2.32	Ratio per 1,000 for Invaliding from causes not specially calculated - -	-	-	4.14
	2,009	53	45.93		581	679	28.09

EUROPEAN TROOPS, 1862.

TABLE showing the SICKNESS and MORTALITY among the EUROPEAN TROOPS serving in the BENGAL PRESIDENCY during the Year 1862, and the Prevalence of the Principal Diseases in each Month of the Year.

MONTHS.	Average Strength.	Average Number Daily Sick.	Daily Sick per Cent. of Average Strength.	Number of Deaths.	Died per 1,000 of Average Strength.	CAUSES OF DEATHS IN HOSPITAL.																	
						Cholera.	Small-pox.	Intermittent Fevers.	Remittent Fevers.	Continued Fevers.	Dysentery, Acute.	Dysentery, Chronic.	Diarrhoea.	Hepatitis, Acute.	Hepatitis, Chronic.	Phthisis Pulmonalis.	Heat Apoplexy.	Delirium Tremens.	Respiratory Diseases.	Heart Diseases.	All other Disease.	Wounds and Accidents.	
January -	43,073	2,858	6.64	42	-	-	-	1	-	1	2	3	2	3	5	7	-	-	4	5	9	-	
February -	43,167	2,913	6.75	31	-	3	-	2	-	-	1	3	4	2	3	4	-	1	6	2	-	-	
March -	42,045	2,908	6.91	31	-	5	-	-	-	2	3	-	1	5	3	5	-	1	1	-	5	-	
April -	43,602	3,262	7.48	57	-	7	1	2	2	6	4	3	4	6	3	11	1	1	2	-	5	-	
May -	43,726	3,378	7.72	48	-	7	1	-	2	5	3	1	1	5	2	8	4	1	2	-	6	-	
June -	43,647	3,309	7.58	45	-	2	-	1	5	3	1	2	1	3	4	5	9	3	2	1	3	-	
July -	43,660	3,452	7.90	138	-	71	1	3	5	5	5	2	3	8	5	7	9	3	3	1	7	-	
August -	43,410	3,789	8.73	284	-	188	-	4	7	15	14	4	3	6	6	9	13	2	3	1	9	-	
September -	43,038	3,761	8.74	167	-	71	-	3	9	12	14	2	6	5	5	5	8	4	6	2	13	2	
October -	42,708	3,744	8.77	167	-	47	-	4	14	12	19	3	4	16	6	8	4	-	7	4	16	3	
November -	42,167	3,423	8.12	71	-	6	-	4	3	7	8	4	2	8	8	6	1	1	3	3	6	1	
December -	41,464	2,721	6.56	72	-	6	-	1	3	1	11	2	8	10	3	5	2	2	4	1	12	1	
						413	2	25	50	69	85	29	39	77	53	80	51	19	43	20	91	7	
Died per 1,000 of Average Strength.																							
						9.61	.04	.58	1.16	1.60	1.99	.67	.91	1.80	1.23	1.86	1.19	.44	1.00	.46	2.12	.16	

Deaths out of Hospital, 55. Died per 1,000 of Average Strength, 1.29.

DISEASES.	NUMBER OF ADMISSIONS INTO HOSPITAL IN EACH MONTH.												Total Admissions during the Year.	Admitted per Cent. of Average Strength.	Died per Cent. of Admission.	
	Jan.	Feb.	March.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.				
Cholera - - - -	2	2	7	14	13	4	136	306	103	69	11	7	674	80.58	61.28	
Small-pox - - -	1	1	1	-	3	6	1	-	-	-	-	-	13		.03	15.40
Intermittent Fevers - - -	1,097	751	807	1,573	1,591	1,905	2,417	2,411	2,683	4,233	3,443	2,386	25,297		80.58	.41
Remittent Fevers - - -	23	25	41	159	207	232	299	263	386	917	358	30	2,940			
Continued Fevers - - -	80	113	163	559	711	703	1,018	1,018	659	850	401	124	6,399			
Dysentery - - - -	130	108	116	169	142	135	176	262	311	234	173	141	2,097	4.88	5.43	
Diarrhoea - - - -	213	207	291	457	341	315	815	963	556	413	262	301	5,134	11.95	.76	
Hepatitis - - - -	204	184	177	284	210	235	283	245	253	243	161	204	2,683	6.24	4.85	
Ophthalmia: - - -	221	174	248	353	176	180	231	226	187	183	146	140	2,465	5.74	-	
Rheumatism - - -	349	309	339	343	249	282	367	341	322	299	269	276	3,745	8.71	-	
Veneral Diseases - - -	1,456	1,410	1,352	1,642	1,061	946	1,167	893	868	1,038	880	958	13,671	31.81	-	
Phthisis Pulmonalis - - -	24	17	16	29	14	28	27	32	20	26	25	25	283	.66	28.27	
Heat Apoplexy - - -	1	-	-	2	9	15	22	12	11	4	1	2	79	.18	64.56	
Delirium Tremens - - -	9	6	14	7	9	13	25	21	16	5	6	5	136	.32	14.00	
Epilepsy - - - -	16	15	9	20	18	7	19	17	10	16	20	14	181	.42	-	
Respiratory Diseases - - -	290	286	283	287	217	196	255	229	202	216	242	213	2,916	6.78	1.47	
Abscess and Ulcer - - -	341	361	370	468	387	401	531	441	362	387	270	266	4,585	10.67	-	
Wounds and Accidents - - -	344	302	368	402	338	271	298	235	215	295	235	354	3,657	8.51	-	
All other Diseases - - -	450	463	557	890	688	708	815	744	683	682	499	571	7,750	18.03	.33	
													84,705			
Admitted per Cent. of Average Strength in each Month.																
12.22	11.01	12.01	17.82	14.85	15.31	20.71	20.15	18.26	23.52	17.22	14.00	197.08				

EUROPEAN TROOPS, 1862—continued.

TABLE showing the SICKNESS and MORTALITY among the EUROPEAN TROOPS serving in BENGAL PROPER during the Year 1862, and the Prevalence of the Principal Diseases in each month of the Year.

MONTHS.	Average Strength.	Average Number Daily Sick.	Daily Sick per Cent. of Average Strength.	Number of Deaths.	Died per 1,000 of Average Strength.	CAUSES OF DEATH.																
						Cholera.	Small-pox.	Intermittent Fevers.	Remittent Fevers.	Continued Fevers.	Dysentery, Acute.	Dysentery, Chronic.	Diarrhoea.	Hepatitis, Acute.	Hepatitis, Chronic.	Phthisis Pulmonalis.	Heat Apoplexy.	Delirium Tremens.	Respiratory Diseases.	Heart Diseases.	All other Diseases.	Wounds and Accidents.
January -	2,429	135	5.56	7	-	-	-	1	-	1	1	1	-	1	-	-	-	-	1	-	1	-
February -	1,632	91	5.58	2	-	1	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-
March -	1,484	96	6.47	2	-	1	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-
April -	2,677	172	6.43	9	-	5	-	-	-	-	-	1	-	-	-	1	1	-	1	-	-	-
May -	2,704	188	6.95	6	-	2	-	-	-	-	-	-	-	1	-	1	2	-	-	-	-	-
June -	2,713	165	6.08	3	-	1	-	-	-	-	-	-	-	-	-	1	-	1	-	-	-	-
July -	2,701	193	7.15	8	-	4	-	-	-	1	-	-	-	2	-	1	-	1	-	-	-	-
August -	2,674	213	7.96	9	-	-	-	-	-	2	-	-	-	1	-	1	3	1	-	-	1	-
September -	2,682	185	6.90	4	-	-	-	1	-	-	-	-	-	-	-	2	1	-	-	-	-	-
October -	2,653	181	6.82	5	-	-	-	-	-	1	-	1	-	-	-	2	-	-	1	-	-	-
November -	2,552	147	5.76	4	-	1	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-
December -	2,587	101	3.90	6	-	-	-	-	-	-	2	-	1	-	-	-	-	1	-	-	2	-
						15	-	2	-	6	3	3	1	6	1	9	7	3	5	-	4	-
Died per 1,000 of Average Strength.																						
	2,457	156	6.35	65	26.45	6.11	-	.81	-	2.44	1.22	1.22	.40	2.44	.40	3.66	2.85	1.22	2.03	-	1.62	-

DISEASES.	NUMBER OF ADMISSIONS INTO HOSPITAL IN EACH MONTH.												Total Admissions during the Year.	Admitted per Cent. of Average Strength.	Died per Cent. of Admissions.	
	Jan.	Feb.	March.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.				
Cholera -	-	1	1	7	3	-	5	-	-	-	1	-	18	.73	89.33	
Small-pox -	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Intermittent Fevers -	36	20	27	30	19	15	53	43	68	64	47	37	459	46.28	.70	
Remittent Fevers -	-	-	2	1	1	-	21	1	3	7	-	-	36			
Continued Fevers -	11	5	7	24	22	53	211	156	63	49	30	11	642			
Dysentery -	16	16	6	13	6	16	12	9	14	11	5	3	117	4.76	5.13	
Diarrhoea -	21	21	18	55	32	15	32	37	37	27	26	17	338	13.75	.29	
Hepatitis -	-	9	6	7	10	5	12	16	8	12	21	10	3	119	4.85	5.88
Ophthalmia -	-	5	6	3	4	9	7	10	8	9	4	7	81	3.29	-	
Rheumatism -	19	9	16	18	17	9	16	25	25	12	9	8	173	7.04	-	
Veneral Diseases -	40	31	29	145	62	48	52	48	44	55	48	43	645	26.25	-	
Phthisis Pulmonalis -	-	-	2	3	1	1	3	1	3	-	-	-	14	.57	64.30	
Heat Apoplexy -	-	-	-	1	2	-	-	2	-	-	-	-	5	.20	100.00	
Delirium Tremens -	1	1	2	1	-	3	2	2	1	-	-	-	13	.53	23.07	
Epilepsy -	1	-	-	2	4	-	1	5	2	1	2	2	20	.81	-	
Respiratory Diseases -	9	6	5	20	10	7	12	10	22	18	21	13	153	6.23	3.27	
Abscess and Ulcer -	20	9	7	32	29	16	26	24	26	45	20	15	269	10.95	-	
Wounds and Accidents -	22	9	10	26	21	10	16	20	20	20	14	25	213	8.67	-	
All other Diseases -	17	10	13	37	29	31	31	44	42	50	31	21	356	14.50	.23	
	227	150	145	429	272	233	519	443	391	389	268	205	3,671			
Admitted per Cent. of Average Strength in each Month.																
	9.35	9.16	9.79	16.03	10.06	8.58	19.21	16.56	14.58	14.66	10.50	7.93		149.41		

TABLE showing the SICKNESS and MORTALITY among the EUROPEAN TROOPS serving in the DINAPORE, BENARES, and OUDE DISTRICTS during the Year 1862, and the Prevalence of the Principal Diseases in each Month of the Year.

MONTHS.	CAUSES OF DEATH.																						
	Average Strength.	Average Number Daily Sick.	Daily Sick per Cent. of Average Strength.	Number of Deaths.	Died per 1,000 of Average Strength.	Cholera.	Small-pox.	Intermittent Fevers.	Remittent Fevers.	Continued Fevers.	Dysentery, Acute.	Dysentery, Chronic.	Diarrhoea.	Hepatitis, Acute.	Hepatitis, Chronic.	Phthisis Pulmonalis.	Heat Apoplexy.	Delirium Tremens.	Respiratory Diseases.	Heart Diseases.	All other Diseases.	Wounds and Accidents.	
						1	1	3	11	16	17	2	1	19	8	12	-	2	9	2	20	1	
January -	9,956	633	6.36	8	-	-	-	-	-	-	-	-	-	1	1	1	-	-	1	-	4	-	
February -	9,836	676	6.88	5	-	-	-	1	-	-	-	-	-	1	1	1	-	-	1	-	1	-	
March -	9,090	611	6.72	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
April -	8,854	677	7.64	11	-	-	-	1	2	3	-	-	-	2	-	3	-	-	2	-	3	-	
May -	8,852	656	7.41	12	-	1	-	-	-	3	-	-	-	1	-	1	-	-	1	-	1	-	
June -	8,832	594	6.73	5	-	-	-	-	1	-	-	1	-	1	-	-	-	-	1	-	1	-	
July -	8,826	617	7.00	7	-	-	-	-	1	-	1	-	-	1	-	1	-	-	-	-	1	-	
August -	8,802	648	7.36	11	-	-	-	-	-	3	4	-	-	-	-	-	-	2	-	-	2	-	
September -	8,789	653	7.43	11	-	-	-	-	1	1	4	-	-	-	1	2	-	-	2	-	2	-	
October -	8,695	602	6.92	27	-	-	-	1	6	4	6	1	-	3	2	1	-	-	-	-	3	-	
November -	8,412	531	6.31	13	-	-	-	-	-	2	2	-	-	3	1	1	-	-	-	2	2	-	
December -	8,466	458	5.41	13	-	-	-	-	-	-	-	-	1	6	2	-	-	-	2	-	1	1	
Died per 1,000 of Average Strength.																							
	8,951	613	6.85	125	13.96	11	11	33	1.23	1.79	1.90	2.22	1.11	2.12	1.90	1.34	-	2.22	1.01	2.22	2.24	1.11	

DISEASES.	NUMBER OF ADMISSIONS INTO HOSPITAL IN EACH MONTH.												Total Admissions during the Year.	Admitted per Cent. of Average Strength.	Died per Cent. of Admissions.
	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.			
Cholera -	1	-	1	2	2	1	-	1	-	-	2	-	10	11	10.00
Small-pox -	-	-	1	-	2	1	1	-	-	-	-	-	5	06	20.00
Intermittent Fevers -	236	155	137	281	205	225	257	207	247	251	219	163	2,583	44.16	76
Remittent Fevers -	5	3	9	37	40	43	57	41	55	135	111	22	558		
Continued Fevers -	16	22	54	124	89	58	91	69	96	144	33	16	812		
Dysentery -	17	22	23	35	27	21	27	54	61	66	36	22	411	4.59	4.62
Diarrhoea -	60	57	74	82	47	59	83	89	81	56	37	41	766	8.56	13
Hepatitis -	33	28	33	45	35	31	40	37	46	42	23	31	424	4.74	6.37
Ophthalmia -	59	44	58	80	33	33	37	34	42	26	20	28	494	5.52	-
Rheumatism -	72	79	77	76	56	79	88	78	66	59	42	50	822	9.18	-
Veneral Diseases -	374	360	247	319	223	160	244	195	194	236	164	210	2,926	32.69	-
Phthisis Pulmonalis -	5	4	2	6	2	4	5	5	5	7	1	3	49	55	24.50
Heat Apoplexy -	-	-	-	-	-	-	1	1	-	-	-	-	2	02	-
Delirium Tremens -	1	-	2	1	3	2	6	3	2	1	1	-	22	24	9.01
Epilepsy -	3	2	1	2	2	-	3	3	1	2	1	1	21	24	-
Respiratory Diseases -	60	69	50	61	38	21	45	46	47	46	43	49	575	6.42	1.57
Abscess and Ulcer -	67	76	74	81	63	73	90	111	75	73	48	57	888	9.92	-
Wounds and Accidents -	64	45	66	74	58	58	60	46	51	51	42	72	687	7.68	-
All other Diseases -	87	105	113	159	156	134	133	155	123	152	102	92	1,511	16.88	31
1,160 1,071 1,022 1,465 1,081 1,003 1,268 1,175 1,192 1,347 925 857													13,566		
Admitted per Cent. of Average Strength in each Month.															
11.65 10.89 11.24 16.55 12.21 11.35 14.37 13.35 13.56 15.49 10.64 10.02													151.56		

EUROPEAN TROOPS, 1862—continued.

TABLE showing the SICKNESS and MORTALITY among the EUROPEAN TROOPS serving in the CAWNPORE, MEERUT, and ROHILCUND DISTRICTS during the Year 1862, and the Prevalence of the Principal Diseases in each Month of the Year.

MONTHS.	Average Strength.	Average Number Daily Sick.	Daily Sick per Cent. of Average Strength.	Number of Deaths.	Died per 1,000 of Average Strength.	CAUSES OF DEATH.																	
						Cholera.	Small-pox.	Intermittent Fevers.	Remittent Fevers.	Continued Fevers.	Dysentery, Acute.	Dysentery, Chronic.	Diarrhoea.	Hepatitis, Acute.	Hepatitis, Chronic.	Phthisis Pulmonalis.	Heat Apoplexy.	Delirium Tremens.	Respiratory Diseases.	Heart Diseases.	All other Diseases.	Wounds and Accidents.	
January -	9,737	760	7.80	12	-	-	-	-	-	-	1	2	-	-	1	3	-	-	-	-	3	2	-
February -	9,940	799	8.04	5	-	1	-	-	-	-	-	2	-	-	1	-	-	-	-	1	-	-	-
March -	9,652	837	8.67	10	-	1	-	-	-	-	-	1	2	3	3	2	-	1	-	-	-	-	-
April -	10,049	953	9.48	17	-	-	-	-	-	2	2	2	3	1	1	2	-	1	1	-	-	2	-
May -	10,055	929	9.24	9	-	1	-	-	-	1	1	-	-	-	1	2	1	1	-	-	1	1	-
June -	9,997	931	9.31	16	-	1	-	-	2	-	1	-	-	-	2	2	2	2	-	-	1	2	-
July -	10,028	954	9.51	31	-	13	-	1	1	-	-	-	-	2	3	-	4	1	2	1	2	1	3
August -	10,003	998	9.98	39	-	18	-	-	1	3	3	1	1	3	2	2	-	1	1	1	-	3	-
September -	10,009	1,012	10.11	22	-	1	-	-	1	3	4	1	-	-	3	1	2	1	2	-	2	1	-
October -	9,971	1,012	10.15	30	-	-	-	1	5	-	5	-	1	4	2	2	1	-	1	-	7	1	-
November -	9,434	934	9.89	11	-	-	-	1	-	1	1	1	-	2	3	1	-	-	1	-	1	1	-
December -	8,841	747	8.45	17	-	-	-	1	3	-	6	-	1	1	1	-	1	-	1	-	2	-	-
						36	-	4	13	10	23	6	11	16	23	17	11	8	9	5	25	2	
Died per 1,000 of Average Strength.																							
	9,810	909	9.27	219	22.23	3.67	-	.41	1.33	1.02	2.35	.61	1.10	1.63	2.34	1.73	1.10	.82	.92	.51	2.55	.20	

DISEASES.	NUMBER OF ADMISSIONS INTO HOSPITAL IN EACH MONTH.												Total Admissions during the Year.	Admitted per Cent. of Average Strength.	Died per Cent. of Admissions.
	Jan.	Feb.	March.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.			
Cholera -	-	1	1	1	1	1	24	28	-	-	-	1	58	.59	62.07
Small-pox -	-	-	-	-	1	3	-	-	-	-	-	-	4	.05	-
Intermittent Fevers -	143	122	141	364	273	331	381	425	455	824	564	229	4,252	58.07	.47
Remittent Fevers -	15	15	17	33	38	68	32	11	13	49	21	3	315		
Continued Fevers -	18	27	30	138	90	152	126	153	119	175	71	31	1,130		
Dysentery -	20	8	27	58	28	39	40	61	73	61	44	42	501	5.11	5.78
Diarrhoea -	37	49	73	120	68	81	189	239	134	87	64	48	1,189	12.12	.92
Hepatitis -	66	56	38	83	74	71	64	78	59	65	37	49	740	7.54	5.27
Ophthalmia -	44	52	87	106	46	53	55	64	49	51	40	42	689	7.02	-
Rheumatism -	80	84	79	90	55	79	88	88	98	82	57	968	9.87	-	
Veneral Diseases -	389	393	387	441	248	247	312	242	244	286	245	205	3,639	37.09	-
Phthisis Pulmonalis -	7	3	3	8	4	11	7	8	5	9	12	7	84	.86	20.24
Heat Apoplexy -	-	-	-	-	4	4	9	-	2	1	-	1	21	.22	52.40
Delirium Tremens -	4	-	4	2	2	3	4	4	4	1	3	2	33	.34	24.24
Epilepsy -	3	5	2	6	1	1	5	4	1	5	5	3	41	.42	-
Respiratory Diseases -	38	54	67	76	49	64	58	53	46	57	60	41	663	6.76	1.36
Abscess and Ulcer -	101	92	98	106	90	101	142	103	105	107	68	75	1,188	12.11	-
Wounds and Accidents -	75	67	71	78	67	55	76	45	47	59	49	76	765	7.69	-
All other Diseases -	91	101	136	221	180	183	175	152	158	168	102	122	1,789	18.23	.35
	1,131	1,129	1,261	1,931	1,319	1,547	1,787	1,758	1,602	2,103	1,467	1,034	18,069		
Admitted per Cent. of Average Strength in each Month.															
	11.61	11.36	13.06	19.21	13.12	15.47	17.80	17.57	16.00	21.09	15.50	11.70	184.19		

EUROPEAN TROOPS, 1862—continued.

TABLE showing the SICKNESS and MORTALITY among the EUROPEAN TROOPS serving in the *Punjab* during the Year 1862, and the Prevalence of the Principal Diseases in each Month of the Year.

MONTHS.	Average Strength.	Average Number Daily Sick.	Daily Sick per Cent. of Average Strength.	Number of Deaths.	Died per 1,000 of Average Strength.	CAUSES OF DEATH.																	
						Cholera.	Small-pox.	Intermittent Fevers.	Remittent Fevers.	Continued Fevers.	Dysentery, Acute.	Dysentery, Chronic.	Diarrhoea.	Hepatitis, Acute.	Hepatitis, Chronic.	Phthisis Pulmonalis.	Heat Apoplexy.	Delirium Tremens.	Respiratory Diseases.	Heart Diseases.	All other Diseases.	Wounds and Accidents.	
January -	15,224	867	5.69	5	-	-	-	-	-	-	-	-	-	1	-	1	-	-	1	2	-	-	
February -	15,749	905	5.75	10	-	-	-	1	-	-	1	-	-	1	-	2	-	-	3	1	-	-	
March -	16,001	902	5.64	5	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	3	-	
April -	16,246	1,015	6.25	9	-	-	-	-	-	-	1	-	-	2	-	3	-	-	-	-	-	-	
May -	16,361	1,150	7.03	15	-	3	-	-	2	-	2	-	1	2	-	3	-	-	-	-	2	-	
June -	16,358	1,162	7.10	10	-	-	-	1	1	1	1	1	1	2	1	1	1	-	1	-	-	-	
July -	16,374	1,161	7.09	60	-	31	-	1	2	4	2	1	3	2	2	4	5	-	1	-	2	-	
August -	16,327	1,291	7.91	99	-	63	-	4	3	5	5	2	1	1	3	2	7	-	1	1	1	-	
September -	16,019	1,275	7.96	94	-	55	-	2	2	6	4	1	3	2	1	1	5	2	1	2	6	1	
October -	15,992	1,182	7.39	93	-	47	-	2	2	5	6	1	3	9	2	2	2	3	4	5	-	-	
November -	15,366	1,002	6.52	28	-	4	-	2	-	3	2	3	2	3	1	3	1	1	1	2	3	-	
December -	15,107	799	5.29	14	-	-	-	-	-	-	1	2	2	3	3	1	1	-	-	1	3	-	
						203	-	12	12	24	26	12	16	27	12	23	22	3	11	12	26	1	
Died per 1,000 of Average Strength.																							
	15,930	1,065	6.69	442	27.75	12.74	-	.75	.75	1.51	1.63	.75	1.00	1.70	.75	1.45	1.38	.19	.69	.75	1.63	.06	

DISEASES.	NUMBER OF ADMISSIONS INTO HOSPITAL IN EACH MONTH.												Total Admissions during the Year.	Admitted per Cent. of Average Strength.	Died per Cent. of Admissions.
	Jan.	Feb.	March.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.			
Cholera -	-	-	-	2	6	-	74	129	81	65	5	1	363	2.28	55.92
Small-pox -	1	1	-	-	-	1	-	-	-	-	-	-	3	.02	-
Intermittent Fevers -	400	273	351	619	863	1,025	1,144	1,257	1,402	1,894	1,545	1,245	12,018	97.20	31
Remittent Fevers -	2	2	7	33	34	39	138	172	206	391	72	1	1,097		
Continued Fevers -	22	38	48	224	440	393	434	292	176	167	100	35	2,369		
Dysentery -	37	32	44	46	64	51	48	89	117	61	45	41	675	4.24	5.63
Diarrhoea -	68	53	94	162	163	139	369	346	207	203	97	84	1,985	12.46	.81
Hepatitis -	50	61	71	116	79	95	125	85	71	77	59	62	951	5.97	4.10
Ophthalmia -	74	42	67	138	71	73	86	94	65	77	59	37	883	5.54	-
Rheumatism -	103	78	122	122	89	76	127	112	79	77	73	108	1,166	7.32	-
Veneral Diseases -	478	422	480	531	393	374	380	291	262	307	243	338	4,499	28.24	-
Phthisis Pulmonalis -	1	9	5	8	5	8	11	13	4	7	3	3	77	.48	30.00
Heat Apoplexy -	-	-	-	-	2	4	10	7	9	3	1	1	37	.23	59.46
Delirium Tremens -	2	-	4	2	4	4	7	4	8	3	2	2	42	.27	7.14
Epilepsy -	4	3	4	4	7	5	8	4	2	7	5	5	58	.37	-
Respiratory Diseases -	133	118	114	107	96	82	105	101	55	66	79	76	1,132	7.11	.97
Abscess and Ulcer -	109	126	140	188	146	133	213	170	121	128	84	87	1,645	10.33	-
Wounds and Accidents -	141	131	154	169	142	118	107	93	82	130	102	136	1,505	9.44	-
All other Diseases -	152	166	203	380	248	284	376	324	292	253	140	169	2,987	18.75	.31
	1,777	1,555	1,908	2,851	2,852	2,904	3,762	3,583	3,239	3,916	2,714	2,431	33,492		
Admitted per Cent. of Average Strength in each Month.															
	11.67	9.88	11.92	17.55	17.43	17.75	22.98	21.94	20.22	24.49	17.66	16.09	210.25		

EUROPEAN TROOPS, 1862—continued.

COMPARATIVE STATEMENT of the Ratios of SICKNESS and MORTALITY among the EUROPEAN TROOPS serving in the various PROVINCES of the *Bengal* Presidency during the Year 1862.

DISEASES.	BENGAL PROPER.				DINAPORE, BENARES, AND OUDE.				CAWNPORE AND MEERUT.				AGRA AND CENTRAL INDIA.				PUNJAB.				BENGAL PRESIDENCY.				
	Average Strength	Daily Sick per Cent. of Strength	Admitted per Cent. of Strength	Died per 1,000 of Strength— A. From Cholera B. From all Causes	Average Strength	Daily Sick per Cent. of Strength	Admitted per Cent. of Strength	Died per 1,000 of Strength— A. From Cholera B. From all Causes	Average Strength	Daily Sick per Cent. of Strength	Admitted per Cent. of Strength	Died per 1,000 of Strength— A. From Cholera B. From all Causes	Average Strength	Daily Sick per Cent. of Strength	Admitted per Cent. of Strength	Died per 1,000 of Strength— A. From Cholera B. From all Causes	Average Strength	Daily Sick per Cent. of Strength	Admitted per Cent. of Strength	Died per 1,000 of Strength— A. From Cholera B. From all Causes	Average Strength	Daily Sick per Cent. of Strength	Admitted per Cent. of Strength	Died per 1,000 of Strength— A. From Cholera B. From all Causes	
Cholera	73	83.33	6.11	—	11	10.00	59	62.07	3.67	386	69.52	26.90	2.28	55.92	12.74	1.57	61.28	9.61	—	—	—	—	—	—	—
Small-pox	—	—	—	—	11	20.00	05	—	—	150.71	100.00	19	02	—	—	0	15.40	04	—	—	—	—	—	—	—
Fever	46.28	70	3.25	—	44.16	76	58.07	47	2.76	5.44	5.43	5.54	97.20	31	3.01	80.58	41	3.34	—	—	—	—	—	—	—
Dysentery	4.76	5.13	2.44	—	4.59	4.62	5.11	5.78	2.96	13.32	69	2.95	4.24	5.63	2.38	4.88	5.43	2.66	—	—	—	—	—	—	—
Diarrhoea	13.75	29	40	—	8.56	13	12.12	92	1.10	6.91	4.00	2.77	5.97	4.10	2.45	11.95	76	91	—	—	—	—	—	—	—
Hepatitis	4.85	5.88	2.84	—	4.74	6.37	7.54	5.27	3.97	4.85	—	—	7.32	—	—	6.24	4.85	3.03	—	—	—	—	—	—	—
Ophthalmia	3.29	—	—	—	5.52	—	7.02	—	—	9.52	—	—	5.54	—	—	5.74	—	—	—	—	—	—	—	—	—
Rheumatism	7.04	—	—	—	9.18	—	9.87	—	—	31.97	—	—	7.32	—	—	8.71	—	—	—	—	—	—	—	—	—
Veneral Diseases	26.25	—	—	—	32.69	—	37.09	—	—	28.24	—	—	28.24	—	—	31.81	—	—	—	—	—	—	—	—	—
Phthisis Pulmonalis	57	64.30	3.66	—	55	24.50	86	20.24	1.73	35	47.40	1.66	48	30.00	1.45	66	28.27	1.86	—	—	—	—	—	—	—
Heat Apoplexy	20	100.00	2.85	—	02	—	22	52.40	1.10	26	78.60	2.02	23	59.46	1.38	18	64.56	1.19	—	—	—	—	—	—	—
Delirium Tremens	53	23.07	1.22	—	24	9.01	34	24.24	82	24	15.40	37	27	7.14	1.19	32	14.00	44	—	—	—	—	—	—	—
Epilepsy	81	—	—	—	24	—	42	—	—	44	—	—	37	—	—	42	—	—	—	—	—	—	—	—	—
Respiratory Diseases	6.23	3.27	2.03	—	6.42	1.57	6.76	1.36	92	6.48	2.00	1.29	7.11	97	69	6.78	1.47	1.00	—	—	—	—	—	—	—
Abscess and Ulcer	10.95	—	—	—	9.92	—	12.11	—	—	9.87	—	—	10.33	—	—	10.67	—	—	—	—	—	—	—	—	—
Wounds and Accidents	8.67	—	—	—	7.68	—	7.69	—	20	7.87	—	55	9.44	—	06	8.51	—	16	—	—	—	—	—	—	—
All other Diseases	14.50	23	1.62	—	16.88	31	18.23	35	3.06	15.52	37	2.40	18.75	31	2.38	18.03	33	2.58	—	—	—	—	—	—	—
	149.41	—	26.45	—	151.56	—	184.19	—	22.33	267.63	—	47.52	210.25	—	27.75	197.08	26.82	—	—	—	—	—	—	—	—

TABLE showing the GENERAL STATISTICS OF SICKNESS AND MORTALITY in the PRINCIPAL MILITARY STATIONS of the Bengal Presidency.

STATIONS.	Period of Observation.	Average Strength during Period of Observation.	Daily Sick per Cent. of Average Strength in each Month.												Daily Sick per Cent. of Average Strength for the Year.	Number of Admissions into Hospital.	Admitted per Cent. of Average Strength.	[Number of Deaths.		Died per 1,000 of Average Strength.		
			Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.				A.	B.	A.	B.	C.
Fort William -	-	880	5.65	6.81	9.23	6.66	7.92	7.34	10.43	9.77	6.79	6.07	6.41	3.44	1,420	161.36	13	18	14.77	20.46	35.23	
Barrackpore -	Av. Str. for 9 months, April to Dec., 902	768	5.50	4.39	5.00	7.04	7.66	6.30	5.71	7.61	5.60	6.21	4.44	4.10	1,138	119.29	-	18	1.38	16.63	16.63	
Berhampore -	-	296	6.45	3.87	3.06	4.38	4.07	4.07	4.07	5.12	5.84	7.90	5.92	6.27	338	144.18	1	5	3.38	18.89	20.27	
Raebangpore -	-	1,101	4.48	3.42	3.38	4.53	4.60	3.79	3.00	3.00	3.44	2.82	6.12	3.33	666	144.15	1	7	-91	15.19	17.19	
Hazarebaugh -	-	655	7.42	9.79	8.86	7.12	7.40	7.55	7.94	8.72	7.02	6.88	6.29	6.07	1,260	192.36	-	10	-	16.34	15.27	
Dinapore -	-	1,142	4.08	4.44	5.93	7.67	6.69	6.24	6.02	7.07	8.55	8.42	7.41	6.55	1,548	135.55	-	15	-	13.14	13.14	
Benares -	-	436	4.83	6.40	7.44	7.96	9.02	8.80	8.59	11.42	20.67	26.34	8.97	11.48	1,010	220.92	-	27	-	55.90	55.90	
Gorakhpore -	Av. Str. for 10 months, Mar. to Dec., 392	483	4.36	7.09	4.95	5.80	5.23	5.87	5.87	7.77	8.38	7.93	5.93	5.37	1,893	240.53	-	27	-	5.08	3.08	
Gondah -	-	787	5.93	7.19	7.82	7.70	6.51	6.12	9.54	7.04	7.35	5.28	4.98	4.04	1,512	120.57	-	7	-	5.58	5.58	
Fyzabad -	-	1,254	6.36	7.59	4.49	6.05	6.39	4.21	4.38	4.90	3.38	4.40	4.44	4.67	1,746	127.10	-	7	-	3.41	3.41	
Roy Barilly -	-	537	8.10	9.23	8.65	10.31	10.45	9.06	8.42	9.31	8.95	7.34	6.09	6.23	3,566	170.38	-	32	-	15.29	15.29	
Lucknow -	-	2,093	7.68	8.93	8.00	8.62	8.54	7.35	7.52	9.97	8.82	7.44	5.67	5.33	985	162.54	-	5	-	8.25	8.25	
Seetapore -	-	606	7.14	6.17	6.60	7.79	8.79	8.89	10.00	12.15	12.11	10.06	10.90	7.47	2,406	217.34	-	21	-	18.97	18.97	
Allahabad -	-	1,107	6.44	5.32	7.54	6.81	6.01	5.94	6.29	6.64	6.32	6.78	4.56	3.55	2,074	164.65	-	18	-	14.30	14.30	
Cawnpore -	-	1,259	7.62	7.48	9.71	10.09	11.19	9.93	8.83	9.73	10.18	12.07	15.11	10.58	1,004	182.88	-	10	-	18.22	18.22	
Futtehgunh -	-	549	4.53	4.03	3.13	3.73	4.41	4.89	5.19	5.20	4.84	4.28	4.51	3.80	1,019	93.00	-	6	-	5.47	5.47	
Barilly -	-	1,096	6.14	8.04	6.70	6.29	7.41	9.26	8.89	8.31	8.14	7.95	6.48	3.81	596	112.45	3	2	5.66	3.77	9.43	
Shahjhanpore -	-	530	8.73	8.73	9.00	12.35	9.91	9.11	9.81	11.03	9.61	11.16	9.22	8.85	887	207.24	-	4	-	9.94	9.94	
Moradabad -	-	428	5.84	5.71	7.46	9.33	8.50	6.82	6.61	9.10	8.00	7.42	5.36	3.72	1,983	177.25	-	12	-	19.64	19.64	
Roorkee -	-	611	6.25	7.78	8.20	8.38	7.61	7.08	7.57	6.81	7.62	8.61	9.78	6.95	3,680	180.54	32	27	15.70	13.25	28.95	
Meerut -	-	2,038	9.09	11.62	12.43	11.89	10.58	13.20	12.08	13.79	14.71	16.23	14.08	11.62	2,588	221.19	-	33	-	28.20	28.20	
Delhi -	-	1,170	9.28	11.04	10.49	10.53	11.33	10.53	8.74	8.55	8.38	9.58	7.85	10.36	1,025	204.18	-	4	-	8.00	8.00	
Muttra -	-	502	3.85	5.48	6.55	5.36	5.80	4.88	7.73	15.32	11.25	16.27	16.09	8.77	2,873	249.18	49	15	42.50	13.01	55.51	
Agra -	-	1,153	3.85	5.20	5.18	6.66	8.51	8.12	7.23	9.29	8.67	7.80	10.82	8.23	452	190.72	20	20	84.39	32.45	84.39	
Gwalior Fortress -	10 Months, January to October	237	5.06	5.50	5.12	5.83	5.68	5.17	5.33	6.23	8.09	14.18	16.31	10.43	2,330	222.33	39	34	37.21	32.45	69.66	
Morar -	-	1,048	10.37	8.27	8.71	8.17	7.78	9.56	11.68	12.95	15.30	17.69	16.31	10.43	2,614	339.92	37	21	48.11	27.31	75.42	
Jhansi -	-	251	5.24	9.16	8.74	8.74	8.74	8.74	11.03	9.89	9.54	8.40	9.58	6.00	599	238.64	-	15	-	8.00	8.00	
Nowong -	-	832	5.15	6.47	6.96	9.24	10.33	10.92	11.65	11.56	13.94	14.93	11.70	9.61	2,253	270.79	-	2	-	18.03	18.03	
Saugor -	-	256	5.83	6.02	5.86	4.58	3.32	5.04	6.30	7.14	6.52	14.90	17.09	7.27	884	374.58	-	1	-	4.24	4.24	
Nagode -	-	847	5.07	6.23	8.26	6.87	7.19	7.53	9.00	10.22	9.46	9.98	10.80	6.32	2,208	260.68	-	20	-	23.61	23.61	
Jubbulpore -	-	1,707	4.52	5.49	5.43	6.54	8.13	8.39	8.00	8.06	6.62	5.46	4.87	4.80	3,787	214.32	2	11	1.13	6.23	7.36	
Umballa -	-	914	-	-	-	7.32	7.90	7.24	7.13	7.16	7.68	6.00	4.46	3.26	882	94.53	-	15	-	16.41	16.41	
Dughaie -	-	810	5.88	6.73	5.86	5.66	6.00	7.30	7.23	6.15	5.08	5.17	4.64	3.00	870	107.41	-	8	-	9.88	9.88	
Subathoo -	-	1,165	3.74	4.69	5.40	5.32	6.13	6.00	6.40	7.92	7.39	5.38	4.73	3.89	1,959	168.15	-	14	-	12.02	12.02	
Jellundoor -	-	967	3.93	3.70	6.42	6.56	5.90	5.64	5.77	7.83	7.69	6.20	3.96	3.26	1,289	133.30	-	4	4.14	15.51	19.65	
Ferzapore -	-	1,362	3.72	5.24	5.21	5.29	5.44	6.00	7.00	8.44	12.79	12.43	9.51	6.70	3,233	237.37	68	37	49.93	27.16	77.09	
Mean Meer -	-	368	5.05	3.36	4.71	6.73	6.73	8.67	7.40	8.77	6.38	6.82	4.38	3.75	1,057	198.68	15	7	28.19	13.16	41.25	
Umritsar and G- vindghur.	-	1,117	5.88	7.28	6.00	5.86	7.20	7.57	7.60	8.64	10.87	11.73	10.80	9.19	3,679	329.36	-	22	-	19.69	19.69	
Mooltan -	-	98	6.60	3.88	4.00	5.03	6.06	8.08	8.16	15.31	14.29	10.31	17.71	18.18	327	333.70	-	4	-	6.94	6.94	
Dera Ismael Khan -	-	1,438	4.00	3.59	4.34	4.63	4.82	5.82	5.33	6.74	5.64	5.05	5.61	5.73	2,184	151.88	10	10	-	-	-	
Sekote -	-	110	-	-	4.55	5.45	6.31	3.63	4.55	6.80	6.30	8.41	-	-	78	-	-	1	-	9.09	9.09	
Kaogra -	8 Months, March to October	156	-	-	-	5.10	3.82	4.46	5.10	3.80	4.46	3.80	-	-	96	-	-	-	-	-	-	
Jhelum -	7 Months, April to October	1,591	7.48	6.41	8.41	9.19	9.00	7.00	7.82	9.63	10.33	7.78	7.17	5.18	4,042	254.05	-	25	-	15.71	15.71	
Rawul Pindiee -	-	350	-	-	3.45	5.95	7.53	11.41	13.24	19.88	-	-	-	-	740	-	-	-	-	2.86	2.86	
Campbellpore -	6 Months, March to August	195	3.70	3.90	3.23	5.53	5.16	6.57	4.78	5.31	4.85	5.50	12.00	7.53	423	217.00	-	1	-	20.51	20.51	
Attock -	-	722	8.06	8.32	3.80	4.64	4.35	3.92	3.57	3.64	4.56	5.40	5.26	5.45	1,164	161.22	2	5	2.77	6.93	9.70	
Nowshera -	-	1,970	6.38	5.89	5.22	7.09	9.20	8.96	7.72	7.70	8.58	10.75	8.28	5.78	5,764	292.60	97	27	49.24	13.70	62.94	
Peshawur -	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	

EUROPEAN TROOPS, 1862—*continued.*

TABLE showing the Ratio in which the PRINCIPAL DISEASES have contributed to make up the ADMISSION-RATE of the Year in the CHIEF MILITARY STATIONS of the Bengal Presidency.

STATIONS.	Average Strength.	ADMITTED INTO HOSPITAL PER CENT. OF AVERAGE STRENGTH.											Admitted per Cent. of Average Strength from all Causes.
		Cholera.	Heat Apoplexy.	Fevers.	Dysentery.	Diarrhoea.	Hepatitis.	Ophthalmia.	Rheumatism.	Veneral Diseases.	Diseases of the Respiratory Organs.	All other Causes.	
Fort William - - -	880	1·82	·23	46·36	4·89	18·52	5·80	3·86	5·57	35·34	6·25	32·72	161·36
Barrackpore (9 months) - -	902	-	·22	35·37	5·32	11·09	3·66	1·11	4·21	16·30	5·87	36·14	119·29
Berhampore - - -	296	·33	-	47·63	2·70	8·10	3·38	10·14	4·73	7·77	4·40	25·00	114·18
Raneegunge - - -	462	-	·22	43·94	2·81	10·61	2·81	1·51	11·69	31·39	6·49	32·68	144·15
Sinhal, Darjeeling - - -	159	-	-	8·81	1·26	1·89	·63	1·88	9·43	26·42	9·43	28·30	83·65
Hazareebaugh - - -	1,101	·18	-	22·89	4·27	3·09	1·03	2·45	2·18	13·71	3·73	15·44	69·03
Dinapore - - -	655	·61	-	26·56	9·16	15·72	4·58	9·62	9·01	51·30	13·74	52·06	192·36
Benares - - -	1,142	·09	-	31·09	7·18	7·43	3·77	2·19	9·11	30·73	4·73	39·23	135·55
Goruckpore (10 months)	392	-	-	145·92	7·65	4·85	3·31	1·79	10·97	17·35	4·85	24·23	220·92
Gondah - - -	787	-	-	113·34	1·65	12·20	1·40	3·81	12·45	46·51	9·02	40·15	240·53
Fyzabad - - -	1,254	-	-	17·46	2·15	8·69	8·69	4·63	9·49	26·87	4·31	38·28	120·57
Rae Bareilly - - -	587	-	-	33·39	2·73	6·82	6·30	8·35	6·13	30·66	5·80	26·92	127·10
Lucknow - - -	2,093	·09	·04	51·03	5·54	8·12	5·35	7·36	10·00	41·00	5·49	36·36	170·38
Sectapore - - -	606	·16	·16	25·25	2·31	12·38	7·26	10·23	13·04	29·70	11·72	50·33	162·54
Allahabad - - -	1,107	-	·09	82·57	6·23	15·54	15·00	4·33	16·62	35·50	9·75	31·71	217·34
Cawnpore - - -	1,259	-	·24	55·36	3·34	10·09	2·86	11·28	5·16	41·14	5·32	39·94	164·65
Futtehgurh - - -	549	-	·18	76·87	2·55	3·28	7·29	5·64	12·02	30·79	5·83	38·43	182·88
Shahjehanpore - - -	530	·57	-	30·75	·00	3·96	3·96	3·40	6·60	32·08	4·15	26·98	112·45
Bareilly - - -	1,096	-	·29	19·89	1·92	4·38	4·65	2·38	9·49	25·00	3·92	21·08	98·00
Moradabad - - -	428	-	·23	57·94	3·50	15·19	4·67	19·63	16·12	42·76	7·48	39·72	207·24
Roorkee - - -	611	-	-	60·72	7·36	14·56	2·62	9·99	9·33	29·30	7·69	35·68	177·25
Meerut - - -	2,038	2·55	·39	42·59	7·55	16·78	5·20	4·36	7·21	46·37	6·72	40·82	180·54
Delhi - - -	1,170	-	·17	95·81	4·96	8·71	5·04	9·40	5·90	37·70	5·13	48·37	221·19
Muttra - - -	502	-	·20	59·36	2·19	8·16	19·12	2·99	6·37	35·45	4·18	66·16	204·18
Agra - - -	1,153	5·72	-	145·10	4·95	8·41	9·37	6·68	9·11	24·20	7·02	28·62	249·18
Gwalior Citadel (10 months)	237	10·97	·42	76·37	9·28	26·59	6·33	7·60	5·48	7·30	1·68	28·70	190·72
Morar - - -	1,048	6·29	·67	121·43	2·96	19·27	7·44	2·96	9·16	17·37	4·01	27·77	222·33
Jhansi - - -	769	6·63	·39	213·39	7·02	19·90	4·68	4·81	5·85	32·25	9·50	35·50	339·92
Nowgong - - -	251	-	·40	132·67	4·38	7·57	6·78	5·58	7·17	31·08	5·18	37·85	238·64
Saugor - - -	832	-	·12	132·33	3·85	6·25	8·06	4·57	12·86	61·77	8·65	32·33	270·79
Nagode - - -	236	-	-	302·12	4·24	8·48	2·12	·43	1·68	17·80	5·51	32·20	374·58
Jubbulpore - - -	847	-	-	125·74	8·38	13·46	4·60	4·37	13·70	36·36	5·43	48·64	260·68
Umballa - - -	1,767	·23	-	103·62	2·49	9·22	4·24	5·54	6·68	30·90	8·28	43·12	214·32
Dugshaie (9 months)	914	-	·11	34·03	3·39	11·27	1·31	2·52	6·02	12·80	4·32	20·68	96·45
Subathoo - - -	810	-	-	11·11	1·36	13·21	3·58	2·96	7·16	28·64	6·05	33·34	107·41
Jullundur - - -	1,165	-	-	54·76	5·84	13·91	4·29	2·49	6·61	35·36	10·73	34·16	168·15
Ferozepore - - -	967	·52	·21	35·78	2·38	9·72	6·41	1·45	6·51	33·30	3·51	33·51	133·30
Meeran Meer - - -	1,362	9·40	·51	100·51	6·17	15·86	9·10	7·57	5·29	24·59	5·51	52·66	237·37
Lahore Citadel - - -	154	6·49	-	69·48	7·80	27·27	7·79	2·60	14·93	21·43	7·14	50·00	214·93
Govindghur and Umritsur -	532	5·64	1·50	84·77	7·89	13·34	6·20	2·07	7·71	22·75	9·59	37·22	198·68
Mooltan - - -	1,117	·09	·09	212·97	5·91	5·91	7·70	5·64	7·79	35·90	8·95	38·41	329·36
Sealkote - - -	1,438	·98	·14	48·68	3·27	10·22	5·56	6·67	3·76	21·70	7·86	43·04	151·88
Rawul Pindee - - -	1,591	·06	·18	141·23	4·28	6·47	6·22	13·33	12·45	31·86	7·61	30·36	254·05
Attock - - -	195	-	-	120·51	12·31	5·13	4·62	3·59	6·67	30·77	5·64	27·68	216·92
Nowshera - - -	722	·28	·14	58·03	3·32	9·98	5·40	2·91	5·40	29·64	8·31	37·81	161·22
Peshawur - - -	1,970	8·53	·36	152·95	4·11	26·09	5·18	4·01	8·32	20·96	5·54	56·55	292·60

EUROPEAN TROOPS, 1862—continued.

TABLE showing the PREVALENCE of SMALL-POX in each Month, and the Distribution of the DISEASE by STATIONS and PROVINCES.

STATIONS.	Average Strength for the Period of Occupation.	NUMBER OF ADMISSIONS INTO HOSPITAL IN EACH MONTH.												Total Admissions.	Admitted per Cent. of Average Strength.	Number of Deaths.	Died per 1,000 of Average Strength.
		Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.				
Presidency Hospitals and Chinsurah Depôt.	403	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Fort William	880	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Barrackpore	768	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Berhampore	296	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Raneegunge	462	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Debroogurh	51	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	2,457	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Darjeeling Depôt (8 months)	105	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Darjeeling	133	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hazareebaugh	1,101	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dinapore	655	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benares	1,142	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Goruckpore	483	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Gondah	787	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Fyzabad	1,254	-	-	-	-	2	1	1	-	-	-	-	-	4	-	1	-
Rae Bareilly	587	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Lucknow	2,093	-	-	1	-	-	-	-	-	-	-	-	-	1	-	-	-
Sectapore	606	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	8,951	-	-	1	-	2	1	1	-	-	-	-	-	5	·06	1	·11
Allahabad	1,107	-	-	-	-	-	3	-	-	-	-	-	-	3	-	-	-
Allahabad General Hospital	95	-	-	-	-	1	-	-	-	-	-	-	-	1	-	-	-
Cawnpore	1,259	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Futtehgurh	549	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Shahjehanpore	530	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bareilly	1,096	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Moradabad	428	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Loohooaghat (8 months)	77	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Nynce Tal (8 months)	339	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Landour (7 months)	204	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Roorkee	611	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Meerut	2,038	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Delhi	1,170	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Muttra	502	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	9,810	-	-	-	-	1	3	-	-	-	-	-	-	4	·05	-	-
Agra	1,153	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Gwalior Fortress (10 months)	237	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Morar	1,048	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Seepree (7 months)	164	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Jhansi	767	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Nowgong	251	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Saugor	832	-	-	-	-	-	1	-	-	-	-	-	-	1	-	1	-
Nagode	236	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Jubbulpore	847	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	5,429	-	-	-	-	-	1	-	-	-	-	-	-	1	·02	1	·19
Umballa	1,767	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Camp Umballa	293	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dugshaie (9 months)	914	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Subathoo	810	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Jutogh	59	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Kussowlie (7 months)	422	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Phillour (8 months)	218	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Jullundur	1,165	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ferozepore	967	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Meean Meer	1,362	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Lahore Citadel	154	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Govindghur and Umritsur	532	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Mooltan	1,117	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dera Ismael Khan	98	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sealkote	1,438	-	-	-	-	-	1	-	-	-	-	-	-	1	-	-	-
Kangra (8 months)	110	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dhumsalla (7 months)	43	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Jhelum (7 months)	156	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Rawul Pindee	1,591	1	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-
Campbellpore (6 months)	350	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Attock	195	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Nowshera	722	-	-	1	-	-	-	-	-	-	-	-	-	1	-	-	-
Peshawur	1,970	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Murree (7 months)	296	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	15,930	1	1	-	-	-	1	-	-	-	-	-	-	3	·02	-	-
BENGAL PRESIDENCY	42,980	1	1	1	-	3	6	1	-	-	-	-	-	13	·03	2	·04

EUROPEAN TROOPS, 1862—continued.

TABLE showing the PREVALENCE of CHOLERA in each Month, and the Distribution of the DISEASE by STATIONS and PROVINCES.

STATIONS.	Average Strength for the period of Occupation.	NUMBER OF ADMISSIONS INTO HOSPITAL IN EACH MONTH.												Total Admissions.	Admitted per Cent. of Average Strength.	Number of Deaths.	Died per 1,000 of Average Strength.
		Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.				
Presidency Hospitals and Chinsurah Depôt.	403	1	—	4	1	1	—	—	—	—	—	3	5	15	—	12	—
Fort William	880	—	1	—	7	2	—	5	—	—	—	1	—	16	—	13	—
Barrackpore	768	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Berhampore	296	—	—	1	—	—	—	—	—	—	—	—	—	1	—	1	—
Raneegunge	462	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Debrooghurh	51	—	—	—	—	1	—	—	—	—	—	—	—	1	—	1	—
	2,457	—	1	1	7	3	—	5	—	—	—	1	—	18	73	15	6.11
Darjeeling Depôt (8 months)	105	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Darjeeling	133	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Hazareebaugh	1,101	—	—	—	1	1	—	—	—	—	—	—	—	2	—	1	—
Dinapore	655	1	—	—	—	1	—	—	—	—	—	2	—	4	—	—	—
Benares	1,142	—	—	—	—	—	1	—	—	—	—	—	—	1	—	—	—
Goruckpore	483	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Gondah	787	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Fyzabad	1,254	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Rae Bareilly	587	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Lucknow	2,093	—	—	—	1	—	—	—	1	—	—	—	—	2	—	—	—
Sectapore	606	—	—	1	—	—	—	—	—	—	—	—	—	1	—	—	—
	8,951	1	—	1	2	2	1	—	1	—	—	2	—	10	11	1	11
Allahabad	1,107	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Allahabad General Hospital	95	—	—	1	—	—	—	—	—	—	—	—	1	2	—	1	—
Cawnpore	1,259	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Futtehghurh	549	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Shahjehanpore	530	—	1	—	—	1	—	—	1	—	—	—	—	3	—	3	—
Bareilly	1,096	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Moradabad	428	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Loohoozghat (8 months)	77	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Nynsee Tal (8 months)	339	—	—	—	—	—	—	—	1	—	—	—	—	1	—	—	—
Landour (7 months)	204	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Roorkee	611	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Meerut	2,038	—	—	—	1	—	1	24	26	—	—	—	—	52	—	32	—
Delhi	1,170	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Muttra	502	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	9,810	—	1	1	1	1	1	24	28	—	—	—	1	58	59	36	3.67
Agra	1,153	—	—	—	—	—	2	1	63	—	—	—	—	66	—	49	—
Gwalior Fortress (10 months)	237	—	—	—	1	—	—	2	23	—	—	—	—	26	—	20	—
Morar	1,048	—	—	—	—	—	—	19	21	22	4	—	—	66	—	39	—
Seepree (7 months)	164	—	—	—	—	—	—	—	1	—	—	—	—	1	—	1	—
Jhansi	767	—	—	—	—	—	—	11	40	—	—	—	—	51	—	37	—
Nowgong	251	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Saugor	832	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Nagode	236	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Jubbulpore	847	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	5,429	—	—	—	1	—	2	33	148	22	4	—	—	210	3.86	146	26.90
Umballa	1,767	—	—	—	—	4	—	—	—	—	—	—	—	4	—	2	—
Camp Umballa	293	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Dugshaie (9 months)	914	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Subathoo	810	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Jutogh	59	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Kussowlie (7 months)	422	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Phillour (8 months)	218	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Jallundur	1,165	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Perozepore	997	—	—	—	—	—	—	1	4	—	—	—	—	5	—	4	—
Meean Meer	1,362	—	—	—	—	1	—	—	87	38	2	—	—	128	—	68	—
Lahore Citadel	154	—	—	—	—	—	—	—	5	4	—	—	1	10	—	5	—
Gevindghur and Umritsur	532	—	—	—	2	—	—	—	11	17	—	—	—	30	—	15	—
Mooltan	1,117	—	—	—	—	1	—	—	—	—	—	—	—	1	—	—	—
Dera Ismael Khan	98	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Sealkote	1,438	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Kangra (8 months)	110	—	—	—	—	—	—	—	—	5	9	—	—	14	—	10	—
Dhurmshalla (7 months)	43	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Jhelum (7 months)	156	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Rawul Pindie	1,591	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Campbellpore (6 months)	350	—	—	—	—	—	—	—	1	—	—	—	—	1	—	—	—
Attock	195	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Nowshera	722	—	—	—	—	—	—	—	2	—	—	—	—	2	—	2	—
Peshawur	1,970	—	—	—	—	—	—	73	14	13	63	5	—	168	—	97	—
Murree (7 months)	296	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	15,930	—	—	—	2	6	—	74	129	81	65	5	1	363	2.23	203	12.74
BENGAL PRESIDENCY	42,980	2	2	7	14	13	4	136	306	103	69	11	7	674	1.57	413	9.61

EUROPEAN TROOPS, 1862—continued.

TABLE showing the MORTALITY in each STATION, the CAUSES of DEATH, and the RATIO of DEATHS to STRENGTH.

STATIONS.	Average Strength for the period of Occupation.	CAUSES OF DEATHS IN HOSPITAL.																	Number of Deaths.	DIED per 1,000 of AVERAGE STRENGTH.		
		Cholera.	Small-pox.	Intermittent Fevers.	Remittent Fevers.	Continued Fevers.	Dysentery, Acute.	Dysentery, Chronic.	Diarrhoea.	Hepatitis, Acute.	Hepatitis, Chronic.	Phthisis Pulmonalis.	Heat Apoplexy.	Delirium Tremens.	Respiratory Diseases.	Heart Diseases.	All other Diseases.	Wounds and Accidents.		A. Cholera.	B. Other Causes.	C. All Causes.
Presidency Hospitals and Chinsurah Depôt	-	12	-	-	1	-	3	3	5	-	3	10	-	1	2	-	4	-	44	-	-	-
Fort William	880	13	-	-	-	2	2	1	1	3	-	4	2	-	1	-	2	-	31	14.77	20.46	35.23
Barrackpore	768	-	-	-	-	3	-	2	-	2	1	3	2	1	2	-	2	-	18	-	16.63	16.63
Berhampore	296	1	-	1	-	1	-	-	-	1	-	-	2	-	-	-	-	-	6	3.38	16.89	20.27
Raneegunge	462	-	-	-	-	-	1	-	-	-	-	1	1	2	2	-	-	-	7	-	15.19	15.19
Debroogurh	51	1	-	1	-	-	-	-	-	-	-	1	-	-	-	-	-	-	3	-	-	-
	2,457	15	-	2	-	6	3	3	1	6	1	9	7	3	5	-	4	-	65	6.11	20.34	26.45
Darjeeling Depôt (8 months)	105	-	-	-	-	-	-	-	-	-	-	1	-	-	1	-	-	-	2	-	-	-
Darjeeling	133	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-
Hazareebaugh	1,101	1	-	-	3	3	4	-	-	-	-	2	-	-	1	1	5	-	19	9.1	16.34	17.25
Dinapore	655	-	-	-	-	2	-	-	-	3	-	1	-	1	1	-	-	-	10	-	15.27	15.27
Benares	1,142	-	-	-	-	5	1	-	1	3	1	-	-	1	2	-	2	1	15	-	13.14	13.14
Goruckpore	483	-	-	2	7	8	3	-	-	2	-	3	-	-	-	-	2	1	27	-	55.90	55.90
Gondah	787	-	-	-	-	-	1	-	-	-	-	-	-	-	2	-	-	-	4	-	5.08	5.08
Fyzabad	1,254	-	1	-	-	-	-	-	-	-	-	2	-	-	1	1	2	-	7	-	5.58	5.58
Rae Bareilly	587	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	3.41	3.41
Lucknow	2,093	-	-	1	-	6	2	-	11	3	3	-	-	1	-	-	5	-	32	-	15.29	15.29
Seetapore	606	-	-	1	-	-	-	-	-	-	4	-	-	-	-	-	-	-	5	-	8.25	8.25
	8,951	1	1	3	11	16	17	2	1	19	8	12	-	2	9	2	20	1	125	11	13.85	13.96
Allahabad	1,107	-	-	1	-	1	-	1	4	1	6	1	1	-	-	2	3	-	21	-	18.97	18.97
Allahabad General Hospital	95	1	-	-	-	-	1	1	-	1	2	1	-	-	2	1	1	-	11	-	-	-
Cawnpore	1,259	-	-	-	-	1	3	1	2	2	-	2	3	1	-	1	3	-	18	-	14.30	14.30
Futtehgarh	549	-	-	-	-	2	1	-	-	1	-	1	1	-	1	1	1	1	10	-	18.22	18.22
Shahjehanpore	530	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5	5.66	3.77	9.43
Bareilly	1,096	-	-	-	-	-	-	-	-	1	1	2	-	1	1	-	-	-	6	-	5.47	5.47
Moradabad	428	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	4	-	9.34	9.34
Loohoozhat (8 months)	77	-	-	-	-	-	1	-	-	-	3	-	-	-	-	-	3	-	4	-	-	-
Nyneee Tal (8 months)	339	-	-	-	-	-	3	1	2	-	-	4	2	1	-	-	-	-	4	-	-	-
Bandonr (7 months)	204	-	-	-	-	1	-	-	1	-	3	5	-	-	2	-	4	-	16	-	-	-
Roorkee	611	-	1	3	1	2	-	-	-	2	1	1	-	-	-	-	1	-	12	-	19.64	19.64
Meerut	2,038	32	-	-	2	4	5	1	1	-	-	1	3	5	-	-	1	3	59	15.70	13.25	28.05
Delhi	1,170	-	-	2	7	-	6	1	1	6	2	1	2	-	3	-	2	1	33	-	28.20	28.20
Muttra	502	-	-	-	1	-	-	-	-	2	-	-	-	-	-	-	-	-	4	-	8.00	8.00
	9,810	36	-	4	13	10	23	6	11	16	23	17	11	8	9	5	25	2	219	3.67	18.66	22.33
Agra	1,153	49	-	-	-	3	1	-	-	1	3	3	-	1	1	-	1	1	64	42.50	13.01	55.51
Gwalior Fortress (10 months)	237	20	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	20	84.39	-	84.39
Morar	1,048	39	-	-	8	1	2	-	4	4	1	1	7	1	2	1	2	-	73	37.21	32.45	69.66
Seepree (7 months)	164	1	-	1	-	1	-	-	-	-	-	-	-	-	-	-	-	-	5	-	-	-
Jhansi	767	37	-	1	-	2	6	2	1	1	-	1	3	-	2	-	2	-	58	48.11	27.31	75.42
Nowgong	251	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	2	-	8.00	8.00
Saugor	832	-	1	1	-	3	-	1	-	2	1	1	-	-	2	-	1	2	15	-	18.93	18.93
Nagode	236	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	1	-	4.24	4.24
Jubbulpore	847	-	-	1	5	3	4	-	-	1	1	2	-	-	-	-	3	-	20	-	23.61	23.61
	5,429	146	1	4	13	13	13	3	5	9	6	9	11	2	7	1	12	3	253	26.90	20.62	47.52
Umballa	1,767	2	-	-	-	-	1	-	1	2	-	4	-	-	-	1	2	-	13	1.13	6.23	7.36
Camp Umballa	293	-	-	1	-	-	2	1	-	-	-	-	-	-	1	-	-	-	5	-	-	-
Dugshaie (9 months)	914	-	-	-	-	-	4	2	2	-	1	2	-	-	-	1	3	-	15	-	16.41	16.41
Subathoo	810	-	-	-	-	2	1	-	2	1	-	1	-	-	-	-	1	-	8	-	9.88	9.88
Jutogh	59	-	-	-	-	1	-	-	-	-	-	1	-	-	-	-	1	-	3	-	-	-
Kussowlie (7 months)	422	-	-	-	-	-	2	-	2	1	1	2	-	-	-	-	3	-	11	-	-	-
Phillour (8 months)	218	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Jullundur	1,165	-	-	-	-	2	1	3	-	3	-	1	-	-	1	2	1	-	14	-	12.02	12.02
Ferozepore	967	4	-	1	2	-	-	-	-	1	2	-	1	-	1	-	7	-	19	4.14	15.51	19.65
Meeran Meer	1,362	68	-	-	6	5	4	1	3	5	-	3	7	-	2	-	1	-	105	49.93	27.16	77.09
Lahore Citadel	154	5	-	-	-	-	1	1	-	1	1	-	-	-	1	-	-	-	10	32.47	32.43	64.90
Govindghur and Umritsur	532	15	-	-	-	-	2	-	-	2	-	-	2	-	-	-	-	-	22	28.19	13.16	41.35
Mooltan	1,117	-	-	8	-	3	2	-	1	2	1	1	1	2	-	-	1	-	22	-	19.69	19.69
Dera Ismael Khan	98	-	-	-	-	-	-	-	1	1	-	-	2	-	-	-	-	-	4	-	-	-
Sealkote	1,438	10	-	-	1	3	-	-	-	-	-	1	1	1	-	1	1	1	20	6.94	6.94	13.88
Kangra (8 months)	110	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-
Dhumsalla (7 months)	43	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Jhelum (7 months)	156	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Rawul Pindoe	1,591	-	-	-	1	2	2	4	1	2	2	3	2	-	2	3	1	-	25	-	15.71	15.71
Campbellpore (6 months)	350	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-
Attock	195	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	1	-	2	-	-	-
Nowshera	722	2	-	-	-	-	-	-	-	1	-	1	1	-	1	1	-	-	7	2.77	6.93	9.70
Peshawur	1,970	97	-	2	2	4	3	-	1	4	1	2	5	-	2	1	-	-	124	49.24	13.70	62.94
Murree (7 months)	296	-	-	-	-	-	1	-	2	-	3	1	-	-	2	1	-	-	10	-	-	-
	15,980	203	-	12	12	24	26	12	16	27	12	23	22	3	11	12	26	1	442	12.74	15.01	27.75
BENGAL PRESIDENCY	42,980	413	2	25	50	69	85	29	39	77	53	80	51	19	43	20	91	7	1,153	9.61	17.21	26.32

EUROPEAN TROOPS, 1862—continued.

TABLE showing the CAUSES of DEATH and INVALIDING.

TOTAL LOSS TO THE SERVICE BY DEATH AND INVALIDING, 2,562. PER 1,000 OF AVERAGE STRENGTH, 59·61.

NUMBER OF MEN LOST TO THE SERVICE BY DEATH, 1,208.				NUMBER OF MEN LOST TO THE SERVICE BY INVALIDING, 1,354.			
CAUSES OF DEATH.	Died in Hospital.	Died out of Hospital.	Died per 1,000 of Strength.	CAUSES OF INVALIDING.	Invalided for Discharge from the Service.	Invalided for Change of Climate.	Invalided per 1,000 of Strength.
Variola - - - - -	2	-	·04	Febris - - - - -	23	52	1·74
Tonsillitis - - - - -	1	-	-	Ophthalmia - - - - -	32	40	1·68
Febris intermittens - - - - -	25	-	·58	Erysipelas - - - - -	-	1	-
Febris remittens - - - - -	50	-	1·16	Dysenteria - - - - -	6	38	1·46
Febris continua - - - - -	69	-	1·60	Diarrhœa - - - - -	1	18	
Erysipelas - - - - -	2	-	-	Rheumatismus - - - - -	136	98	5·45
Pyæmia - - - - -	1	-	-	Syphilis - - - - -	26	67	2·28
Anthrax - - - - -	1	-	-	Stricture Urethræ - - - - -	1	4	
Dysenteria Acuta - - - - -	85	-	2·66	Purpura - - - - -	-	1	-
Dysenteria Chronica - - - - -	29	-		Anasarca - - - - -	-	4	-
Diarrhœa - - - - -	39	-	-	Scirrhomæ - - - - -	-	2	-
Cholera - - - - -	413	-	9·61	Scrofula - - - - -	8	6	-
Rheumatismus - - - - -	2	-	-	Phthisis Pulmonalis - - - - -	50	24	1·88
Syphilis - - - - -	9	-	-	Hæmoptysis - - - - -	1	6	
Bubo - - - - -	1	-	-	Apoplexia - - - - -	-	2	-
Hydrophobia - - - - -	2	-	-	Paralysis - - - - -	8	1	-
Privatio - - - - -	1	-	-	Mania - - - - -	7	5	·74
Æbriositas - - - - -	4	3	-	Dementia - - - - -	15	5	
Anæmia - - - - -	2	-	-	Epilepsia - - - - -	18	5	·54
Anasarca - - - - -	3	-	-	Cephalæa - - - - -	2	5	-
Carcinoma - - - - -	1	-	-	Dysecœa - - - - -	7	1	-
Scrofula - - - - -	1	-	-	Neuralgia - - - - -	2	-	-
Morbus Coxæ - - - - -	1	-	-	Pericarditis - - - - -	1	5	1·68
Phthisis Pulmonalis - - - - -	80	-	1·86	Morbus Cordis - - - - -	31	28	
Meningitis - - - - -	2	-	-	Aneurisma - - - - -	2	1	
Encephalitis - - - - -	3	-	-	Palpatatio - - - - -	2	1	
Apoplexia - - - - -	51	2	1·23	Angina pectoris - - - - -	-	1	-
Paralysis - - - - -	5	-	-	Varix - - - - -	9	4	-
Hemiplegia - - - - -	1	-	-	Bronchitis - - - - -	14	17	·93
Delirium Tremens - - - - -	19	1	·46	Pleuritis - - - - -	1	4	
Tetanus - - - - -	3	-	-	Pneumonia - - - - -	-	2	
Morbus Cordis - - - - -	11	3	·65	Asthma - - - - -	-	1	
Aneurisma - - - - -	9	5	-	Emphysema - - - - -	-	1	-
Laryngitis - - - - -	3	-	-	Gastritis - - - - -	-	1	-
Œdema Glottidis - - - - -	1	-	-	Peritonitis - - - - -	-	1	-
Bronchitis Acuta - - - - -	8	-	-	Dyspepsia - - - - -	2	12	-
Bronchitis Chronica - - - - -	10	-	1·00	Hernia - - - - -	8	1	-
Pleuritis - - - - -	2	-	-	Hæmorrhoids - - - - -	1	3	-
Pneumonia - - - - -	17	-	-	Fistula in ano - - - - -	-	1	-
Asthma - - - - -	2	-	-	Splenitis - - - - -	2	7	-
Gastritis - - - - -	2	-	-	Hepatitis - - - - -	52	156	4·84
Enteritis - - - - -	9	-	-	Icterus - - - - -	-	2	-
Peritonitis - - - - -	11	-	-	Nephria - - - - -	1	-	-
Ileus - - - - -	2	-	-	Cystitis - - - - -	-	1	-
Hernia - - - - -	1	-	-	Hæmaturia - - - - -	-	1	-
Splenitis - - - - -	5	-	-	Fistula in perineo - - - - -	-	1	-
Hepatitis Acuta - - - - -	77	-	3·03	Orchitis - - - - -	-	5	-
Hepatitis Chronica - - - - -	53	-		Synovitis - - - - -	5	3	-
Icterus - - - - -	3	-	-	Caries - - - - -	1	-	-
Ascites - - - - -	3	-	-	Necrosis - - - - -	-	4	-
Nephritis - - - - -	5	-	-	Exostosis - - - - -	1	1	-
Hæmaturia - - - - -	1	-	-	Contractura - - - - -	4	-	-
Synovitis - - - - -	1	-	-	Psoriasis - - - - -	-	1	-
Asthénia - - - - -	1	-	-	Abscess - - - - -	3	1	-
Not diagnosed - - - - -	1	-	-	Ulcer - - - - -	2	16	-
Struck by Lightning - - - - -	-	1	-	Debilitas (worn out) - - - - -	65	107	4·00
Drowning - - - - -	-	11	-	Injury - - - - -	22	7	·67
Execution - - - - -	-	1	-				
Murder - - - - -	-	1	-				
Suffocation - - - - -	-	2	-				
Fracture - - - - -	1	-	1·09				
Concussion of Brain - - - - -	4	-					
Accident - - - - -	-	10	-				
Rupture of Spleen - - - - -	-	1	-				
Poisoning - - - - -	1	-	-				
Snake-bite - - - - -	1	-	-				
Suicide - - - - -	-	13	-				
Found dead, cause of death unknown - - - - -	-	1	-				
Ratio per 1,000 for deaths from causes not specially calculated - - - - -	-	-	2·23	Ratio per 1,000 for Invaliding from causes not specially calculated - - - - -	-	-	3·61
TOTAL - - - - -	1,153	55	28·11	TOTAL - - - - -	572	782	31·50

EUROPEAN TROOPS, 1863.

TABLE showing the SICKNESS and MORTALITY among the EUROPEAN TROOPS serving in the Bengal Presidency during the Year 1863, and the Prevalence of the Principal Diseases in each Month of the Year.

MONTHS.	Average Strength.	Average Number Daily Sick.	Daily Sick per Cent. of Average Strength.	Number of Deaths.	Died per 1,000 of Average Strength.	CAUSES OF DEATHS IN HOSPITAL.																	
						Cholera.	Small-pox.	Intermittent Fevers.	Remittent Fevers.	Continued Fevers.	Dysentery, Acute.	Dysentery, Chronic.	Diarrhea.	Hepatitis, Acute.	Hepatitis, Chronic.	Phthisis Pulmonalis.	Heat Apoplexy.	Delirium Tremens.	Respiratory Diseases.	Heart Diseases.	All other Diseases.	Wounds and Accidents.	
January -	41,665	2,612	6·27	67	-	2	-	4	-	3	5	4	5	7	1	8	1	-	11	3	11	2	
February -	41,482	2,578	6·21	36	-	-	-	2	1	2	3	1	1	7	2	6	1	-	1	3	5	1	
March -	41,525	2,520	6·07	37	-	-	-	-	2	1	3	-	1	7	4	7	-	1	2	1	8	-	
April -	42,249	2,752	6·51	69	-	16	3	1	3	7	1	4	2	6	4	8	1	2	2	-	8	1	
May -	42,311	3,124	7·39	48	-	2	4	1	1	5	5	1	2	3	1	5	5	2	3	4	4	-	
June -	42,266	3,108	7·35	69	-	2	2	2	4	4	5	1	2	5	7	7	12	6	2	1	4	3	
July -	42,043	3,268	7·77	139	-	69	1	3	3	8	5	-	3	5	5	8	7	1	2	5	14	-	
August -	41,919	3,510	8·37	128	-	57	-	3	5	8	17	5	1	6	2	6	8	2	-	1	7	-	
September -	41,481	3,515	8·47	102	-	10	-	6	5	8	16	3	3	12	5	6	6	3	3	3	13	-	
October -	40,565	3,039	7·49	116	-	9	-	5	7	3	20	3	5	23	10	12	3	1	3	1	10	1	
November -	39,428	2,485	6·30	56	-	1	-	1	2	-	10	2	4	7	8	6	1	-	3	1	9	1	
December -	39,272	2,030	5·17	63	-	1	-	2	3	2	6	1	4	4	9	10	-	2	7	2	6	4	
						169	10	30	36	51	96	25	33	92	58	89	45	20	39	25	99	13	
Died per 1,000 of Average Strength.																							
						4·09	·24	·72	·87	1·23	2·33	·61	·79	2·23	1·41	2·15	1·09	·48	·94	·61	2·39	·31	

Deaths out of Hospital, 107. Died per 1,000 of Average Strength, 2·59.

DISEASES.	NUMBER OF ADMISSIONS INTO HOSPITAL IN EACH MONTH.												TOTAL Admissions during the Year.	Admitted per Cent. of Average Strength.	Died per Cent. of Admissions.
	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.			
Cholera -	4	1	3	17	3	2	101	69	10	11	3	1	225	·55	75·11
Small-pox -	-	1	1	20	15	7	1	-	-	-	-	-	45	·11	22·22
Intermittent Fevers -	1,258	751	757	1,300	1,697	1,802	2,629	2,505	3,613	4,013	2,627	1,667	24,619	73·90	·33
Remittent Fevers -	15	12	29	81	174	203	396	292	302	233	71	21	1,829		
Continued Fevers -	76	97	161	462	543	587	644	451	621	308	99	62	4,111		
Dysentery -	115	102	88	158	152	132	218	294	244	204	147	161	2,015	4·87	6·06
Diarrhoea -	182	149	189	366	237	200	727	732	408	342	230	217	3,979	9·62	·83
Hepatitis -	132	156	180	220	225	289	329	267	234	287	162	152	2,633	6·37	5·69
Ophthalmia -	149	149	232	289	166	150	195	163	161	162	100	121	2,037	4·93	-
Rheumatism -	286	294	296	336	270	300	388	357	310	363	294	296	3,790	9·17	-
Venereal Diseases -	1,298	1,037	1,131	1,433	965	849	919	697	717	879	811	914	11,650	28·17	-
Phthisis Pulmonalis -	46	12	17	28	26	25	38	30	37	29	21	19	328	·79	27·13
Heat Apoplexy -	1	5	3	3	11	16	27	16	5	4	3	-	94	·23	47·87
Delirium Tremens -	7	4	8	13	15	12	20	17	20	19	10	6	151	·36	13·24
Epilepsy -	12	14	13	9	11	11	16	17	12	16	5	15	151	·36	-
Respiratory Diseases -	273	203	229	251	254	253	348	207	218	284	204	246	2,970	7·18	1·31
Abscess and Ulcer -	265	284	301	422	341	400	481	374	319	378	252	306	4,123	9·97	-
Wounds and Accidents -	288	255	309	357	297	289	318	269	272	331	477	398	3,860	9·34	-
All other Diseases -	508	427	542	703	665	652	892	766	659	708	442	447	7,411	17·92	·42
	4,915	3,953	4,489	6,468	6,067	6,179	8,687	7,523	8,162	8,571	5,958	5,049	76,021		
Admitted per Cent. of Average Strength in each Month.															
	11·80	9·53	10·81	15·31	14·34	14·62	20·66	17·95	19·68	21·13	15·11	12·86	183·84.		

EUROPEAN TROOPS, 1863—continued.

TABLE showing the SICKNESS and MORTALITY among the EUROPEAN TROOPS serving in *Bengal Proper* during the Year 1863, and the Prevalence of the Principal Diseases in each Month of the Year.

MONTHS.	Average Strength.	Average Number Daily Sick.	Daily Sick per Cent. of Average Strength.	Number of Deaths.	Died per 1,000 of Average Strength.	CAUSES OF DEATH.																		
						Cholera.	Small-pox.	Intermittent Fevers.	Remittent Fevers.	Continued Fevers.	Dysentery, Acute.	Dysentery, Chronic.	Diarrhoea.	Hepatitis, Acute.	Hepatitis, Chronic.	Phthisis Pulmonalis.	Heat Apoplexy.	Delirium Tremens.	Respiratory Diseases.	Heart Diseases.	All other Diseases.	Wounds and Accidents.		
January	2,311	123	5·32	6	-	-	-	-	-	-	1	1	1	-	-	-	-	-	-	1	1			
February	2,313	133	5·75	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
March	2,401	136	5·66	3	-	-	-	-	-	1	1	-	-	-	-	-	-	-	-	-	-			
April	2,196	113	5·15	4	-	2	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-			
May	2,032	135	6·64	3	-	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
June	2,024	149	7·36	6	-	-	-	-	1	1	1	-	-	-	-	-	2	-	-	-	-			
July	1,940	156	8·04	4	-	-	-	-	-	-	1	-	-	-	1	-	-	-	1	-	-			
August	1,980	175	8·84	1	-	-	-	-	-	-	1	-	-	-	-	1	-	-	-	-	-			
September	1,952	183	9·37	6	-	1	-	-	-	1	2	-	-	-	1	-	-	-	-	-	-			
October	1,213	88	7·25	2	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
November	1,217	73	6·00	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
December	1,137	63	5·54	3	-	-	-	-	-	1	-	-	-	-	-	-	-	1	-	-	1			
						6	1	1	1	4	8	1	1	2	-	1	2	4	1	1	4	1		
Died per 1,000 of Average Strength.																								
						1,893	127	6·71	39	20·60	3·17	·53	·53	·53	2·11	4·21	·53	·53	1·06	-	·53	1·06	2·11	·53
DISEASES.	NUMBER OF ADMISSIONS INTO HOSPITALS IN EACH MONTH.												TOTAL Admissions during the Year.	Admitted per Cent. of Average Strength.	Died per Cent. of Admissions.									
	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.												
Cholera	-	1	1	2	-	-	1	-	1	2	1	-	9	·48	66·66									
Small-pox	-	-	-	-	1	-	-	-	-	-	-	-	1	·05	-									
Intermittent Fevers	66	27	50	56	77	96	173	175	146	72	36	31	1,005	59·17	-									
Remittent Fevers	2	-	-	-	-	-	-	1	-	-	-	-	3		·45									
Continued Fevers	5	15	15	7	4	2	38	10	7	5	2	2	112		-									
Dysentery	6	16	8	18	30	21	19	19	27	17	3	6	190	10·04	5·26									
Diarrhoea	20	23	26	29	16	9	26	25	25	9	8	16	232	12·25	·43									
Hepatitis	7	9	7	6	10	4	21	24	7	11	8	3	117	6·18	1·71									
Ophthalmia	8	12	13	7	7	6	8	2	7	2	2	1	75	3·96	-									
Rheumatism	21	14	20	19	9	11	10	7	12	11	1	4	139	7·34	-									
Venereal Diseases	48	46	36	58	29	25	31	30	13	16	15	25	372	19·65	-									
Phthisis Pulmonalis	3	-	-	1	1	3	-	1	6	1	1	1	18	·95	-									
Heat Apoplexy	-	-	1	-	-	2	-	-	-	-	-	-	3	·16	66·66									
Delirium Tremens	-	-	-	1	1	-	2	1	1	-	1	2	9	·47	44·44									
Epilepsy	-	-	-	-	-	-	-	2	-	3	-	1	6	·32	-									
Respiratory Diseases	19	20	22	9	26	22	21	17	7	4	4	4	175	9·25	·57									
Abscess and Ulcer	23	20	20	17	12	23	12	18	17	12	7	9	190	10·04	-									
Wounds and Accidents	23	17	21	21	20	16	17	9	9	10	12	13	188	9·93	-									
All other Diseases	29	33	54	24	34	28	38	37	51	32	11	19	390	20·60	·44									
												280	253	204	275	277	268	417	378	336	207	112	137	3,234
Admitted per Cent. of Average Strength in each Month.																								
						12·12	10·94	12·24	12·53	13·63	13·24	21·49	19·09	17·21	17·06	9·20	12·05	170·84						

Six Men, belonging to regiments stationed in Lower Bengal, died on board the Hospital Ship "Bentinck," during the year. These deaths are not included in this table.

EUROPEAN TROOPS, 1863—*continued.*

TABLE showing the SICKNESS and MORTALITY among the EUROPEAN TROOPS serving in the *Dinapore*, *Benares*, and *Oude* Districts during the Year 1863, and the prevalence of the Principal Diseases in each Month of the Year.

MONTHS.	Average Strength.	Average Number Daily Sick.	Daily Sick per Cent. of Average Strength.	Number of Deaths.	Died per 1,000 of Average Strength.	CAUSES OF DEATH.																		
						Cholera.	Small-pox.	Intermittent Fevers.	Remittent Fevers.	Continued Fevers.	Dysentery, Acute.	Dysentery, Chronic.	Diarrhoea.	Hepatitis, Acute.	Hepatitis, Chronic.	Phthisis Pulmonalis.	Heat Apoplexy.	Delirium Tremens.	Respiratory Diseases.	Heart Diseases.	All other Diseases.	Wounds and Accidents.		
January -	8,250	470	5·70	10	-	1	-	-	-	-	1	1	-	-	2	1	1	1	-	-	1	-	2	-
February -	8,438	522	6·18	3	-	-	-	-	-	-	-	1	-	-	1	1	1	1	-	-	-	-	-	-
March -	8,294	527	6·35	8	-	-	-	-	-	-	-	-	-	-	3	3	1	1	-	-	2	2	2	-
April -	8,838	609	6·89	24	-	12	1	-	-	2	-	-	-	-	3	1	1	1	-	-	1	1	2	1
May -	8,916	651	7·30	7	-	-	1	-	-	-	-	-	-	-	-	-	-	2	-	-	2	2	2	-
June -	8,928	649	7·27	15	-	1	-	-	-	1	3	-	-	-	-	3	3	2	-	-	2	1	-	-
July -	8,892	646	7·26	38	-	30	-	-	-	-	2	-	-	-	2	2	2	2	-	-	1	1	1	-
August -	8,849	645	7·29	23	-	13	-	-	2	1	-	-	-	-	2	2	2	2	-	-	-	-	1	-
September -	8,812	628	7·13	17	-	4	-	1	-	-	1	-	1	-	2	1	3	1	1	-	-	-	2	-
October -	8,780	578	6·58	23	-	5	-	1	1	2	1	-	1	7	1	1	2	2	-	-	-	-	2	1
November -	8,519	484	5·63	8	-	-	-	-	-	1	1	-	1	3	1	2	-	-	-	-	-	-	-	-
December -	8,254	413	5·00	12	-	-	-	-	2	-	1	-	-	2	1	-	-	-	-	3	1	2	-	-
						66	2	1	5	6	12	1	2	27	13	16	5	2	10	2	16	2		
						Died per 1,000 of Average Strength.																		
	8,647	570	6·59	188	21·74	7·63	·23	·12	·58	·70	1·39	·12	·23	3·12	1·50	1·85	·58	·23	1·15	·23	1·85	·23		

DISEASES.	NUMBER OF ADMISSIONS INTO HOSPITAL IN EACH MONTH.												TOTAL Admissions during the Year.	Admitted per Cent. of Average Strength.	Died per Cent. of Admissions.
	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.			
Cholera -	1	-	2	13	-	1	52	18	3	7	-	-	97	1·12	68·04
Small-pox -	-	-	-	2	-	1	-	-	-	-	-	-	3	·03	-
Intermittent Fevers -	162	150	164	274	343	386	491	388	410	304	142	97	3,311	47·57	·29
Remittent Fevers -	6	5	11	23	20	28	57	23	47	26	5	3	254		
Continued Fevers -	17	13	24	113	77	84	117	30	25	20	20	9	549	4·51	3·33
Dysentery -	13	14	28	39	36	33	55	53	37	40	17	25	390		
Diarrhoea -	25	42	50	80	54	32	164	141	82	82	46	33	831	9·61	-
Hepatitis -	23	27	39	51	38	52	54	47	47	78	28	30	514	5·95	7·78
Ophthalmia -	17	30	43	57	45	39	44	34	31	45	23	29	437	5·05	-
Rheumatism -	36	54	63	62	68	70	85	64	76	96	57	54	785	9·08	-
Venereal Diseases -	242	219	218	298	184	222	199	171	200	210	223	217	2,603	30·10	-
Phthisis Pulmonalis -	3	3	4	6	5	8	1	2	8	3	1	1	45	·52	35·55
Heat Apoplexy -	-	2	-	1	2	2	-	4	-	-	-	-	11	·13	45·45
Delirium Tremens -	-	1	-	2	1	3	3	5	8	1	3	3	32	·37	6·25
Epilepsy -	1	-	1	4	2	2	3	2	4	1	-	2	22	·25	-
Respiratory Diseases -	50	37	52	52	44	47	87	39	51	55	37	44	595	6·88	1·68
Abscess and Ulcer -	43	56	59	91	87	83	85	77	63	71	50	62	827	9·57	-
Wounds and Accidents -	60	38	61	80	58	41	73	59	52	66	79	80	747	8·64	-
All other Diseases -	85	103	118	148	135	153	186	153	135	172	97	92	1,577	18·24	·29
	784	794	939	1,396	1,199	1,287	1,756	1,310	1,279	1,277	828	781	13,630		
	Admitted per Cent. of Average Strength in each Month.														
	9·50	9·41	11·32	15·79	13·44	14·41	19·74	14·79	14·51	14·54	9·72	9·45		157·62	

EUROPEAN TROOPS, 1863—continued.

TABLE showing the SICKNESS and MORTALITY among the EUROPEAN TROOPS serving in the *Cawnpore, Meerut, and Rohilcund* Districts during the Year 1863, and the prevalence of the Principal Diseases in each month of the Year.

MONTHS.	Average Strength.	Average Number Daily Sick.	Daily Sick per Cent. of Average Strength.	Number of Deaths.	Died per 1,000 of Average Strength.	CAUSES OF DEATH.																					
						Cholera.	Small-pox.	Intermittent Fevers.	Remittent Fevers.	Continued Fevers.	Dysentery, Acute.	Dysentery, Chronic.	Diarrhoea.	Hepatitis, Acute.	Hepatitis, Chronic.	Phthisis Pulmonalis.	Heat Apoplexy.	Delirium Tremens.	Respiratory Diseases.	Heart Diseases.	All other Diseases.	Wounds and Accidents.					
January -	9,274	694	7.48	22	-	-	-	-	-	-	-	1	4	2	-	3	1	-	4	1	5	1					
February -	9,473	727	7.67	13	-	-	-	1	1	1	1	1	-	4	1	3	-	-	1	3	-	-					
March -	9,467	664	7.01	10	-	-	-	-	1	-	1	-	-	3	1	3	-	-	-	1	1	-					
April -	9,591	781	8.14	15	-	1	2	-	1	-	1	2	1	1	2	2	-	1	-	1	1	-					
May -	9,568	830	8.67	12	-	1	2	-	1	-	2	-	-	-	-	1	3	1	-	-	1	-					
June -	9,518	819	8.60	17	-	1	2	-	1	1	-	-	1	2	3	2	3	1	-	-	-	-					
July -	9,497	849	8.94	52	-	30	-	2	1	1	2	-	2	1	1	4	2	-	-	-	6	-					
August -	9,424	903	9.58	43	-	31	-	1	2	1	2	1	1	1	-	3	2	1	-	1	2	-					
September -	9,398	863	9.18	31	-	5	-	2	3	1	4	3	1	2	1	1	1	1	-	-	6	-					
October -	9,351	743	7.94	22	-	1	-	-	1	-	3	2	1	5	3	3	-	-	1	-	2	-					
November -	8,349	544	6.52	12	-	-	-	-	-	-	-	-	-	2	3	2	-	-	-	1	3	1					
December -	7,594	412	5.43	11	-	-	-	-	-	1	-	1	1	-	4	2	-	-	1	-	1	-					
						70	6	6	12	6	16	10	12	23	18	26	12	5	7	3	31	2					
Died per 1,000 of Average Strength.																											
						9.209	7.36	7.99	2.65	28.78	7.61	.65	.65	1.30	.65	1.74	1.09	1.30	2.50	1.96	2.82	1.30	.54	.76	.32	3.37	.22

DISEASES.	NUMBER OF ADMISSIONS INTO HOSPITAL IN EACH MONTH.												TOTAL Admissions during the Year.	Admitted per Cent. of Average Strength.	Died per Cent. of Admissions.									
	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.												
Cholera -	3	-	-	1	3	-	27	39	6	1	-	-	80	.87	87.50									
Small-pox -	-	-	1	17	12	6	-	-	-	-	-	-	36	.39	16.66									
Intermittent Fevers -	169	87	108	231	232	304	454	389	401	344	122	86	2,927	46.23	.56									
Remittent Fevers -	2	3	6	15	73	43	52	90	81	43	10	5	423											
Continued Fevers -	15	18	35	134	167	123	149	96	113	30	13	14	907											
Dysentery -	35	26	16	35	33	33	47	64	53	36	25	20	423	4.59	6.15									
Diarrhoea -	39	23	34	102	56	52	221	178	90	80	41	47	963	10.46	1.24									
Hepatitis -	21	27	32	40	46	69	68	50	56	54	33	27	528	5.73	7.77									
Ophthalmia -	46	44	59	64	40	33	43	41	48	40	21	24	503	5.46	-									
Rheumatism -	64	68	72	77	57	82	93	84	79	74	65	46	861	9.35	-									
Venereal Diseases -	331	249	313	377	244	202	238	162	186	260	234	232	3,028	32.89	-									
Phthisis Pulmonalis -	7	3	4	8	9	3	11	9	5	8	8	2	77	.84	33.77									
Heat Apoplexy -	-	1	1	1	6	3	5	4	1	-	1	-	23	.25	52.15									
Delirium Tremens -	2	1	-	1	4	2	6	3	3	2	-	-	24	.26	20.80									
Epilepsy -	2	3	6	1	4	3	2	3	3	6	1	4	38	.41	-									
Respiratory Diseases -	48	43	39	58	52	64	99	54	52	76	49	42	676	7.34	1.04									
Abscess and Ulcer -	66	72	84	95	80	94	105	79	69	99	53	80	976	10.59	-									
Wounds and Accidents -	64	51	67	61	65	70	68	56	75	76	78	48	779	8.46	-									
All other Diseases -	113	78	96	187	181	159	235	202	166	166	113	84	1,780	19.33	.45									
												15,052												
Admitted per Cent. of Average Strength in each Month.																								
												11.07	8.41	10.28	15.69	14.25	14.13	20.25	17.01	15.82	14.92	10.45	10.02	163.45

EUROPEAN TROOPS, 1863—continued.

TABLE showing the SICKNESS and MORTALITY among the EUROPEAN TROOPS serving in the *Agra District* and in *Central India* during the Year 1863, and the Prevalence of the Principal Diseases in each Month of the Year.

MONTHS.	Average Strength.	Average Number Daily Sick.	Daily Sick per Cent. of Average Strength.	Number of Deaths.	Died per 1,000 of Average Strength.	CAUSES OF DEATH.																	
						Cholera.	Small-pox.	Intermittent Fevers.	Remittent Fevers.	Continued Fevers.	Dysentery, Acute.	Dysentery, Chronic.	Diarrhoea.	Hepatitis, Acute.	Hepatitis, Chronic.	Phthisis Pulmonalis.	Heat Apoplexy.	Delirium Tremens.	Respiratory Diseases.	Heart Diseases.	All other Diseases.	Wounds and Accidents.	
January -	5,226	306	5·85	5	-	-	-	1	-	-	-	-	-	1	-	-	-	-	2	-	-	1	-
February -	5,085	323	5·68	6	-	-	-	-	-	1	1	-	1	2	-	-	1	-	-	-	-	-	-
March -	5,695	307	5·39	4	-	-	-	-	1	-	-	-	-	1	-	-	-	-	-	-	-	1	-
April -	5,580	379	6·79	8	-	-	-	-	-	-	3	-	-	-	-	2	-	-	1	-	-	-	-
May -	5,567	421	7·56	4	-	-	-	-	-	1	1	-	-	1	-	-	-	-	-	-	-	1	-
June -	5,564	401	7·21	5	-	-	-	-	-	-	-	-	1	-	-	-	2	-	-	-	-	-	-
July -	5,562	399	7·17	17	-	9	1	-	1	1	-	-	-	-	1	1	1	-	-	-	1	1	-
August -	5,530	445	8·05	23	-	12	-	-	1	1	4	1	-	-	-	1	-	1	-	-	-	2	-
September -	5,500	466	8·47	19	-	-	-	1	-	4	3	-	-	3	-	-	1	1	2	3	1	-	-
October -	5,448	410	7·53	18	-	-	-	1	3	-	4	-	1	6	1	-	1	-	1	-	1	-	-
November -	5,309	346	6·52	5	-	-	-	-	-	-	2	-	-	-	1	-	-	-	1	1	-	-	-
December -	5,248	276	5·26	6	-	-	-	-	-	-	-	-	-	1	-	1	-	-	2	1	-	1	-
						21	1	3	6	11	16	1	3	17	3	5	6	4	8	6	8	1	
Died per 1,000 of Average Strength.																							
	5,493	373	6·79	120	21·85	3·82	·18	·55	1·09	2·00	2·92	·18	·55	3·09	·55	·91	1·09	·73	1·46	1·09	1·46	·18	

DISEASES.	NUMBER OF ADMISSIONS INTO HOSPITAL IN EACH MONTH.												Total Admissions during the Year.	Admitted per Cent. of Average Strength.	Died per Cent. of Admissions.
	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.			
Cholera -	-	-	-	-	-	1	21	11	-	-	-	-	33	73·82	·49
Small-pox -	-	1	-	1	-	-	1	-	-	-	-	-	3		
Intermittent Fevers -	177	117	129	228	181	172	372	317	450	491	329	206	3,169		
Remittent Fevers -	-	1	2	25	15	2	6	18	22	9	1	-	101	5·98	5·18
Continued Fevers -	16	28	39	78	64	77	94	103	140	91	32	23	785		
Dysentery -	16	17	17	31	18	18	35	61	46	36	16	17	328		
Diarrhoea -	27	26	29	43	24	25	139	147	51	49	29	10	599	10·91	·50
Hepatitis -	19	17	28	27	24	24	36	31	23	36	13	15	293	5·33	6·82
Ophthalmia -	16	18	25	14	16	9	25	20	23	24	11	10	211	3·84	-
Rheumatism -	40	40	47	51	48	51	64	67	54	65	46	45	618	11·25	-
Venereal Diseases -	192	166	170	245	157	152	160	130	113	125	122	145	1,877	34·17	-
Phthisis Pulmonalis -	2	-	3	2	-	2	5	1	4	4	2	-	25	·46	20·00
Heat Apoplexy -	-	1	-	-	-	3	1	1	1	2	1	-	10	·18	60·00
Delirium Tremens -	3	2	1	1	1	4	3	3	3	2	2	1	26	·47	15·38
Epilepsy -	-	1	2	-	-	3	4	4	3	2	-	2	21	·38	-
Respiratory Diseases -	41	27	42	51	52	25	33	36	33	55	33	29	457	8·32	1·75
Abscess and Ulcers -	50	32	52	57	56	73	61	44	45	68	39	35	612	11·14	-
Wounds and Accidents -	24	27	36	47	29	34	33	28	33	41	25	41	398	7·25	-
All other Diseases -	54	55	61	77	69	66	94	88	98	98	51	68	879	16·00	·32
	677	576	683	978	754	741	1,187	1,110	1,142	1,198	752	647	10,445		
Admitted per Cent. of Average Strength in each Month.															
	12·95	10·13	11·99	17·53	13·54	13·32	21·34	20·07	20·76	21·99	14·16	12·33	190·15		

EUROPEAN TROOPS, 1863—continued.

TABLE showing the SICKNESS and MORTALITY among the EUROPEAN TROOPS serving in the *Punjab* during the Year 1863, and the Prevalence of the Principal Diseases in each Month of the Year.

MONTHS.	Average Strength.	Average Number Daily Sick.	Daily Sick per Cent. of Average Strength.	Number of Deaths.	Died per 1,000 of Average Strength.	CAUSES OF DEATH.																	
						Cholera.	Small-pox.	Intermittent Fevers.	Remittent Fevers.	Continued Fevers.	Dysentery, Acute.	Dysentery, Chronic.	Diarrhoea.	Hepatitis, Acute.	Hepatitis, Chronic.	Phthisis Pulmonalis.	Heat Apoplexy.	Delirium Tremens.	Respiratory Diseases.	Heart Diseases.	All other Diseases.	Wounds and Accidents.	
January -	15,256	809	5.30	16	-	-	-	2	-	1	2	2	-	1	-	1	-	-	3	1	2	2	1
February -	15,168	772	5.09	10	-	-	-	1	-	-	-	-	-	-	-	1	3	-	-	-	1	1	1
March -	15,591	864	5.54	9	-	-	-	-	-	-	-	-	1	-	2	1	1	-	-	-	1	4	-
April -	15,973	853	5.34	17	-	-	-	1	2	2	-	2	1	1	1	3	1	-	-	-	-	4	-
May -	16,088	1,060	6.59	21	-	-	-	1	-	4	2	-	2	2	1	2	2	1	-	4	-	-	-
June -	16,011	1,063	6.64	26	-	-	-	2	2	1	1	1	-	3	1	2	3	2	1	1	1	3	3
July -	15,889	1,195	7.52	27	-	-	-	1	1	6	-	-	1	1	1	2	4	-	2	3	3	5	-
August -	15,878	1,316	8.29	29	-	1	-	2	-	5	10	1	-	3	2	-	4	-	-	-	-	1	-
September -	15,563	1,328	8.53	28	-	-	-	2	2	2	6	-	1	4	2	2	3	-	1	-	-	3	-
October -	15,427	1,171	7.59	49	-	1	-	4	2	2	11	-	3	5	4	7	2	1	2	1	4	-	
November -	15,559	985	6.33	24	-	-	-	1	2	-	6	2	2	2	2	-	1	-	1	-	5	-	
December -	15,519	765	4.93	28	-	-	-	2	1	-	4	-	3	1	4	7	-	1	1	-	2	2	
						2	-	19	12	23	42	8	14	22	21	30	20	5	12	13	34	7	
Died per 1,000 of Average Strength.																							
	15,660	1,015	6.48	284	18.14	.13	-	1.21	.77	1.47	2.68	.51	.89	1.40	1.34	1.92	1.23	.32	.77	.83	2.17	.45	

DISEASES.	NUMBER OF ADMISSIONS INTO HOSPITAL IN EACH MONTH.												Total Admissions during the Year.	Admitted per Cent. of Average Strength.	Died per Cent. of Admissions.
	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.			
Cholera -	-	-	-	-	-	-	-	1	-	1	-	-	2	.01	100.00
Small-pox -	-	-	-	-	2	-	-	-	-	-	-	-	2	.01	-
Intermittent Fevers -	641	363	304	509	862	842	1,135	1,222	2,200	2,779	1,991	1,233	14,081	107.57	.92
Remittent Fevers -	5	3	10	18	66	130	281	160	149	154	54	12	1,042		
Continued Fevers -	11	23	45	130	228	300	246	208	329	160	31	11	1,722		
Dysentery -	32	25	19	35	30	22	54	93	77	65	77	81	610	3.89	8.20
Diarrhoea -	56	30	48	109	80	81	176	235	157	112	101	80	1,265	8.08	1.11
Hepatitis -	51	68	73	94	105	135	145	111	92	97	72	65	1,108	7.07	3.88
Ophthalmia -	42	43	92	146	57	63	70	64	52	48	40	47	764	4.88	-
Rheumatism -	98	109	93	123	87	85	133	129	85	104	117	122	1,285	8.21	-
Venereal Diseases -	418	338	390	451	340	244	286	199	196	253	210	225	3,550	22.67	-
Phthisis Pulmonalis -	5	2	4	11	8	7	15	16	9	9	5	7	98	.63	30.61
Heat Apoplexy -	1	1	1	1	3	6	21	7	3	2	1	-	47	.30	42.55
Delirium Tremens -	2	-	5	8	8	3	6	5	5	14	3	-	59	.38	8.47
Epilepsy -	4	9	4	4	4	1	7	6	2	3	3	2	49	.31	-
Respiratory Diseases -	105	72	74	77	79	94	100	59	69	88	77	106	1,000	6.33	1.20
Abscess and Ulcer -	73	103	85	162	106	125	215	155	118	122	97	91	1,452	9.27	-
Wounds and Accidents -	106	118	123	148	123	127	127	115	102	135	279	203	1,706	10.90	-
All other Diseases -	141	143	208	262	234	242	332	281	199	224	155	152	2,573	16.43	.47
	1,791	1,450	1,578	2,288	2,422	2,507	3,349	3,066	3,844	4,370	3,313	2,437	32,415		
Admitted per Cent. of Average Strength in each Month.															
	11.74	9.56	10.12	14.32	15.05	15.66	21.07	19.31	24.70	28.33	21.29	15.71	206.99		

COMPARATIVE STATEMENT of the Ratios of Sickness and Mortality among the EUROPEAN TROOPS serving in the various PROVINCES of the Bengal Presidency during the Year 1863.

	BENGAL PROPER.				DINAPORE, BENARES, AND OUDH.				CAWNPORE AND MEERUT.				AGRA AND CENTRAL INDIA.				PUNJAB.				BENGAL PRESIDENCY.			
	Average Strength	Daily Sick per Cent. of Strength	Admitted per Cent. of Strength	Died per 1,000 of Strength— A. From Cholera B. From all Causes	Average Strength	Daily Sick per Cent. of Strength	Admitted per Cent. of Strength	Died per 1,000 of Strength— A. From Cholera B. From all Causes	Average Strength	Daily Sick per Cent. of Strength	Admitted per Cent. of Strength	Died per 1,000 of Strength— A. From Cholera B. From all Causes	Average Strength	Daily Sick per Cent. of Strength	Admitted per Cent. of Strength	Died per 1,000 of Strength— A. From Cholera B. From all Causes	Average Strength	Daily Sick per Cent. of Strength	Admitted per Cent. of Strength	Died per 1,000 of Strength— A. From Cholera B. From all Causes	Average Strength	Daily Sick per Cent. of Strength	Admitted per Cent. of Strength	Died per 1,000 of Strength— A. From Cholera B. From all Causes
DISEASES.	1,893	671	170.84	3.17	8,647	6.59	157.62	7.63	9,209	7.99	168.45	7.61	5,403	6.79	190.15	3.82	15,680	6.48	206.99	13	41,351	6.96	183.84	4.09
Cholera	48	66.66	3.17	1.12	68.04	7.63	1.12	7.63	87.50	7.61	87.50	7.61	63.64	8.82	100.00	13	75.11	4.09	75.11	4.09	75.11	4.09	75.11	4.09
Small-pox	05	—	—	03	—	—	—	—	16.66	65	16.66	65	33.33	18	—	—	22.22	24	22.22	24	22.22	24	22.22	24
Fever	59.17	45	3.17	47.57	29	1.40	2.9	1.40	46.23	2.60	46.23	2.60	49	3.64	32	3.45	38	2.82	38	2.82	38	2.82	38	2.82
Dysentery	10.04	5.26	4.74	4.51	3.33	1.51	3.33	1.51	6.15	2.83	6.15	2.83	5.18	3.10	8.20	3.19	6.06	2.04	6.06	2.04	6.06	2.04	6.06	2.04
Diarrhea	12.25	43	5.3	9.61	24	2.3	2.4	2.3	12.4	1.30	12.4	1.30	50	5.5	1.11	.89	83	.79	83	.79	83	.79	83	.79
Hepatitis	6.18	1.71	1.06	5.95	7.78	4.62	—	—	7.77	4.46	7.77	4.46	6.82	3.64	3.88	2.74	6.37	3.64	6.37	3.64	6.37	3.64	6.37	3.64
Ophthalmia	3.96	—	—	5.05	—	—	—	—	—	—	—	—	—	—	—	—	4.93	—	4.93	—	4.93	—	4.93	—
Rheumatism	7.34	—	—	9.08	—	—	—	—	—	—	—	—	—	—	—	—	9.17	—	9.17	—	9.17	—	9.17	—
Veneral Diseases	19.65	—	—	30.10	—	—	—	—	—	—	—	—	—	—	—	—	28.17	—	28.17	—	28.17	—	28.17	—
Phthisis Pulmonalis	95	—	53	52	35.55	1.85	—	1.85	33.77	2.82	33.77	2.82	20.00	91	30.61	1.92	79	2.15	79	2.15	79	2.15	79	2.15
Heat Apoplexy	16	66.66	1.06	13	45.45	5.8	—	5.8	52.15	1.30	52.15	1.30	60.00	1.09	42.55	1.28	23	1.09	23	1.09	23	1.09	23	1.09
Delirium Tremens	47	44.44	2.11	37	6.25	2.3	—	2.3	20.80	5.4	20.80	5.4	15.38	7.3	8.47	.92	36	.48	36	.48	36	.48	36	.48
Epilepsy	32	—	—	25	—	—	—	—	—	—	—	—	—	—	—	—	36	—	36	—	36	—	36	—
Respiratory Diseases	9.25	57	53	6.88	1.68	1.15	—	1.15	7.34	.76	7.34	.76	1.75	1.46	1.20	.77	7.18	.94	7.18	.94	7.18	.94	7.18	.94
Abscess and Ulcer	10.04	—	—	9.57	—	—	—	—	—	—	—	—	—	—	—	—	9.97	—	9.97	—	9.97	—	9.97	—
Wounds and Accidents	9.93	—	53	8.64	—	2.3	—	2.3	8.46	.22	8.46	.22	7.25	18	10.90	.45	9.84	.81	9.84	.81	9.84	.81	9.84	.81
All other Diseases	20.60	44	2.64	18.24	2.9	2.03	—	2.03	19.33	3.69	19.33	3.69	32	2.55	16.43	3.00	17.92	3.00	17.92	3.00	17.92	3.00	17.92	3.00
	170.84	—	20.60	157.62	—	21.74	—	21.74	163.45	28.78	163.45	28.78	100.15	21.85	206.99	13.14	183.84	22.49	183.84	22.49	183.84	22.49	183.84	22.49

EUROPEAN TROOPS, 1863—continued.

TABLE showing the GENERAL STATISTICS of SICKNESS and MORTALITY in the Principal Military Stations of the Bengal Presidency.

STATIONS.	PERIOD OF OBSERVATION.	Average Strength during period of observation.	DAILY SICK PER CENT. OF AVERAGE STRENGTH IN EACH MONTH.										Number of Admissions into Hospital.	Admitted per Cent. of Average Strength.	NUMBER OF DEATHS.			DIED PER 1,000 OF AVERAGE STRENGTH.		
			Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.						
																		A. All other Causes.	B. Cholera.	A. All other Causes.
Fort William	-	745	4-68	6-09	5-56	4-50	8-01	9-17	8-92	9-41	8-12	8-61	8-37	7-79	173-14	4	13	5-37	17-45	22-82
Dum-Dum	-	648	5-70	6-75	6-51	7-34	5-97	6-05	7-39	11-62	11-62	11-62	8-37	7-79	173-14	4	13	5-37	17-45	22-82
Barrackpore	-	439	5-73	4-08	4-62	3-82	3-86	5-12	6-77	4-65	4-65	3-48	2-80	2-93	116-20	1	7	1-54	10-81	12-35
Berhampore	-	223	5-51	5-10	5-17	4-20	8-65	8-37	6-77	4-65	4-65	3-48	2-80	2-93	116-20	1	7	1-54	10-81	12-35
Dayjeeling	-	246	3-09	7-07	6-64	5-28	6-10	6-10	5-28	2-88	1-65	1-65	2-06	1-70	201-33	-	5	2-28	18-22	20-50
Jhazeebhangh	-	730	8-25	8-77	9-92	10-17	11-28	11-44	10-65	12-67	10-59	10-10	7-83	6-14	201-33	-	5	2-28	18-22	20-50
Dinapore	-	925	6-40	5-60	5-51	5-82	6-13	5-36	6-95	6-95	7-24	6-26	7-06	6-00	100-00	3	13	-	12-19	12-19
Benares and Raj Ghat	-	1,210	6-85	7-58	7-30	5-82	6-13	5-36	6-95	6-95	7-24	6-26	7-06	6-00	100-00	3	13	-	12-19	12-19
Azimgur and Jounpore	-	336	-	-	-	5-09	5-73	4-31	4-52	5-67	6-00	5-09	5-06	5-16	172-06	1	8	3-24	17-81	21-92
Gondah	-	1,073	4-18	5-02	6-56	6-74	7-54	5-33	4-40	5-13	4-90	4-00	3-99	5-23	100-32	35	16	28-93	8-65	11-80
Fyzabad	-	402	6-02	7-12	6-43	7-13	8-20	8-30	8-06	6-81	6-85	6-82	7-93	5-66	202-98	3	10	-	13-22	13-22
Roy Bareilly	-	2,420	5-83	2-00	2-84	4-33	4-05	3-00	3-80	4-75	5-56	6-53	5-48	4-08	62-50	-	1	-	2-98	2-98
Lucknow	-	592	3-16	4-18	4-29	5-81	6-69	6-33	6-95	7-00	7-29	6-63	6-31	5-48	122-58	-	15	-	13-98	13-98
Allahabad	-	1,054	7-30	8-77	7-56	9-15	9-06	8-86	9-38	11-57	9-36	12-25	9-73	5-47	108-41	25	44	10-33	7-46	7-46
Cawnpore	-	1,162	3-90	4-22	5-11	5-88	6-94	5-91	6-86	5-43	6-11	6-31	6-32	6-82	147-42	25	44	10-33	18-18	28-51
Futteeoghur	-	567	9-15	8-32	8-41	8-32	10-46	9-22	10-48	11-03	11-21	8-38	5-69	5-06	137-19	4	39	41-75	6-76	6-76
Shahjeanpore	-	539	4-16	3-80	4-19	5-51	7-00	7-73	7-03	7-06	7-63	6-31	6-31	6-31	107-24	44	39	41-75	37-00	78-75
Bareilly	-	916	6-02	8-25	8-07	6-73	5-57	5-71	5-78	5-58	6-59	6-48	4-49	3-93	137-78	24	22	20-65	18-94	39-59
Roorkee	-	587	5-22	5-14	3-62	4-02	5-53	5-70	5-60	6-50	6-15	4-50	3-43	5-55	128-04	-	5	-	8-82	8-82
Moradabad	-	393	5-33	4-87	7-04	7-45	6-46	9-28	8-00	11-48	10-36	6-32	4-01	4-30	103-15	-	7	-	13-00	13-00
Meerut	-	2,024	6-89	6-71	7-60	8-32	7-15	6-96	7-78	8-77	7-96	7-46	6-73	3-70	119-10	-	12	-	13-10	13-10
Delhi	-	1,066	10-70	9-37	8-51	6-97	10-40	10-67	10-77	11-21	13-22	7-07	5-30	4-88	137-23	-	7	-	11-92	11-92
Muttra	-	581	4-84	6-50	5-76	7-51	6-36	6-08	7-48	7-52	8-00	7-25	5-09	2-93	154-25	-	3	-	7-63	7-63
Aggra	-	1,115	5-56	5-52	5-00	7-16	7-04	5-02	4-95	7-02	7-75	5-87	5-09	2-93	256-93	-	6	-	35-65	35-65
Morar	-	1,195	5-56	5-13	4-43	5-19	5-82	6-37	6-35	7-11	7-56	6-92	6-25	4-83	171-25	21	18	18-83	10-33	10-33
Gwalior Citadel	-	241	4-41	3-45	4-39	7-75	8-71	5-82	6-37	6-35	7-11	7-56	6-92	6-25	176-32	21	18	18-83	10-33	10-33
Jhansi	-	742	7-02	7-07	7-91	8-77	10-51	10-67	10-77	11-21	13-22	7-07	5-30	4-88	179-95	23	23	19-30	19-30	19-30
Nowgong	-	215	6-76	5-29	6-00	8-11	8-18	7-73	6-48	6-06	10-61	10-62	9-01	6-23	194-00	-	4	-	16-60	16-60
Saugor	-	845	6-71	7-00	6-37	7-00	7-09	7-30	6-86	6-06	5-50	5-50	5-71	6-00	179-24	-	6	-	12-13	12-13
Nagode	-	214	3-55	2-40	3-91	4-40	6-70	7-30	6-86	6-06	5-50	5-50	5-71	6-00	225-11	-	15	-	27-91	27-91
Jubbulpore	-	820	5-30	4-67	5-66	7-91	10-00	8-88	8-83	9-71	10-93	10-40	10-00	7-26	218-93	-	15	-	17-75	17-75
Umballa	-	1,083	4-69	5-45	5-07	4-83	5-10	5-35	5-07	6-22	8-52	6-73	3-81	2-71	153-74	-	3	-	14-02	14-02
Dugshie	-	825	3-20	4-09	4-10	3-79	4-91	7-20	8-31	8-43	8-05	6-53	3-81	2-71	211-83	-	17	-	20-73	20-73
Subahnoo	-	800	3-50	2-29	9-32	8-94	7-45	4-74	6-51	8-95	8-40	5-13	2-86	4-73	140-70	1	18	62	10-67	11-29
Kassowlee	-	242	-	-	-	8-20	9-50	10-33	10-73	7-91	7-50	5-13	2-86	4-73	62-55	14	14	-	16-97	16-97
Jullundur	-	751	5-16	5-26	6-05	4-81	5-68	5-17	4-80	5-07	5-84	4-57	3-00	3-40	84-77	-	21	-	24-42	24-42
Perozepore	-	759	4-86	4-38	4-80	6-06	4-90	5-16	4-80	5-16	5-04	4-20	4-64	2-00	137-36	-	3	-	24-79	24-79
Meen Meer	-	1,303	5-59	5-21	5-33	6-18	7-23	5-60	4-58	7-29	9-53	7-53	5-26	4-49	98-92	-	12	-	7-62	7-62
Unrisutur and Govind-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	134-85	-	14	-	14-32	14-32
gluur	-	409	4-31	4-17	3-62	7-73	9-35	8-77	7-51	12-04	12-28	8-41	4-80	3-66	187-04	-	30	-	79-35	79-35
Mooltan	-	1,042	7-13	5-31	4-85	5-01	4-97	6-09	7-72	10-19	10-38	6-27	4-18	3-21	200-55	-	17	-	16-31	16-31
Sealkote	-	1,225	6-87	8-21	8-23	7-57	8-57	8-72	9-37	9-14	9-88	9-62	11-30	5-27	167-83	-	15	-	11-38	11-38
Rawul Pindee	-	1,252	8-11	5-81	5-56	5-95	5-85	9-00	10-21	9-66	-	-	-	-	188-92	-	9	-	5-45	5-45
Campbellpore	-	347	-	-	-	2-30	2-29	4-31	2-88	4-31	3-48	-	-	-	49-57	-	1	-	-	-
Nowshera	-	650	3-78	3-21	3-55	4-71	5-38	4-69	3-96	6-00	9-56	-	-	-	126-10	-	6	-	9-10	9-10
Peshawur	-	1,720	5-02	5-26	5-42	6-19	7-06	7-91	8-53	6-86	11-36	13-75	16-89	10-12	428-90	-	29	-	16-86	16-86

Troops were withdrawn from many of the Stations of the Punjab towards the close of the year, and were incorporated into the Eusufzai Field Force.

EUROPEAN TROOPS, 1863—continued.

TABLE showing the Ratio in which the PRINCIPAL DISEASES have contributed to make up the ADMISSION RATE of the Year in the CHIEF MILITARY STATIONS of the BENGAL PRESIDENCY.

STATIONS.	Average Strength.	ADMITTED INTO HOSPITAL PER CENT. OF AVERAGE STRENGTH.											Admitted per Cent. of Average Strength from all Causes.
		Cholera.	Heat Apoplexy.	Fevers.	Dysentery.	Diarrhoea.	Hepatitis.	Ophthalmia.	Rheumatism.	Veneral Diseases.	Diseases of the Respiratory Organs.	All other Causes.	
Fort William - -	745	·67	·13	35·57	14·09	12·08	6·98	2·55	7·52	28·19	15·03	50·33	173·14
Dum-Dum (9 months)	648	·15	·15	56·64	6·79	6·48	3·24	2·93	7·71	8·96	3·24	19·91	116·02
Barrackpore - -	439	·46	·23	60·82	5·69	18·68	3·42	2·73	4·33	10·36	6·38	40·92	169·20
Berhampore - -	223	·45	-	99·10	7·17	8·07	13·00	11·21	6·28	8·52	6·28	41·25	201·33
Darjeeling - -	246	-	-	38·62	1·22	4·88	4·88	6·91	6·50	6·91	2·03	28·05	100·00
Hazareebaugh - -	730	·41	·14	67·95	4·52	9·04	3·29	3·56	11·37	30·96	7·26	33·56	172·06
Dinapore - -	925	·43	·11	22·16	4·00	10·70	4·87	7·57	8·97	50·27	8·32	42·92	160·32
Benares and Raj Ghat	1,210	3·64	·25	84·71	6·94	14·96	3·97	5·21	8·26	22·97	5·54	46·53	202·98
Azimgur and Joun- pore (6 months) - -	336	-	-	22·32	·89	2·38	2·08	2·09	6·25	10·72	3·57	12·20	62·50
Gondah - -	815	-	·25	28·71	1·72	6·87	2·94	2·21	9·57	37·67	5·52	27·12	122·58
Fyzabad - -	1,073	-	-	94·59	1·96	5·59	9·23	4·01	11·55	26·93	9·23	35·32	198·41
Rae Bareilly (10 months) - -	402	-	-	19·40	·25	·49	8·21	2·99	4·48	14·92	1·00	16·91	68·65
Lucknow - -	2,420	1·90	·17	26·28	6·69	12·19	6·65	6·45	7·93	30·13	7·93	41·12	147·42
Seetapore - -	592	-	-	27·56	4·22	5·74	6·76	3·38	5·91	29·56	6·25	33·01	127·19
Allahabad - -	1,054	5·12	·38	43·55	7·40	19·73	4·36	3·98	4·74	42·69	4·74	30·55	167·24
Cawnpore - -	1,162	1·46	-	29·69	2·23	10·93	4·22	4·56	4·56	36·23	5·77	38·13	137·78
Futtehgurh - -	567	-	-	45·15	1·41	3·35	2·47	4·93	13·05	17·81	4·07	35·80	128·04
Shahjehanpore - -	539	-	·37	23·93	1·11	2·04	1·30	2·60	10·02	35·81	5·75	20·22	103·15
Bareilly - -	916	-	·22	14·63	4·91	3·17	4·47	7·64	5·24	32·75	5·89	40·18	119·10
Roorkee - -	587	-	-	29·30	4·94	11·58	2·89	6·30	6·13	19·25	6·64	40·20	127·23
Moradabad - -	393	-	·25	42·75	1·28	5·85	4·84	8·14	12·21	33·84	7·38	36·13	152·67
Meerut - -	2,024	-	·05	35·37	5·93	7·75	7·07	3·66	13·49	38·54	7·31	35·08	154·25
Delhi - -	1,066	-	·75	117·54	4·97	15·48	5·53	7·97	8·54	29·45	10·51	56·19	256·93
Muttra (10 months) -	581	·35	·51	61·10	3·44	7·23	5·69	6·54	6·54	18·93	9·98	50·94	171·25
Agra - -	1,115	2·87	·09	66·99	5·83	26·10	5·65	4·12	7·90	19·10	8·34	29·33	176·32
Morar - -	1,192	-	·17	61·75	5·71	6·37	8·14	4·53	16·44	25·17	14·34	37·93	179·95
Gwalior Citadel -	241	-	-	29·05	5·81	6·22	5·39	7·05	10·37	34·02	2·90	33·10	134·00
Jhansi - -	742	-	-	54·85	7·41	9·84	5·25	3·37	14·29	47·93	3·50	32·75	170·24
Nowgong - -	215	-	·93	92·56	·93	6·98	4·66	3·72	15·35	23·25	10·68	66·05	225·11
Saugor - -	845	-	·12	77·99	3·90	8·64	3·78	5·21	12·19	47·34	10·41	49·35	213·93
Nagode - -	214	-	-	82·25	1·40	7·01	1·87	1·87	4·20	25·23	5·61	24·30	153·74
Jubbulpore - -	820	·12	·49	110·24	10·24	2·20	3·66	1·09	4·51	47·08	4·27	27·93	211·83
Umballa - -	1,683	·06	-	56·09	3·09	8·85	3·45	4·63	7·07	22·52	6·00	28·94	140·70
Dugshaie (10 months)	825	-	-	16·61	2·55	3·39	1·09	·73	4·73	12·00	3·15	18·30	62·55
Subathoo - -	860	-	-	16·05	2·33	6·74	1·28	7·33	6·86	20·32	4·30	19·53	84·77
Jullundur (11 months)	787	-	-	32·40	3·31	12·83	4·06	2·54	10·67	29·99	9·91	30·75	137·36
Ferozepore (10 months)	838	-	·24	25·89	·84	7·99	7·40	2·27	5·01	14·44	5·25	29·59	98·92
Meean Meer (11 months) - -	1,363	-	-	41·16	1·17	8·07	5·50	5·21	9·69	22·67	6·46	34·93	134·85
Umritsur and Govind- ghur - -	409	-	·73	59·17	22·00	14·91	13·94	8·07	8·07	17·12	9·78	33·25	187·04
Mooltan - -	1,042	-	2·69	153·36	4·51	4·99	5·66	3·84	7·58	22·07	7·39	48·46	260·55
Sealkote (10 months)	3,318	-	·15	67·53	1·37	5·16	9·94	4·70	7·36	18·67	5·84	47·11	167·83
Rawul Pindee (8 months) - -	1,652	-	-	104·12	2·00	4·35	7·45	6·72	8·47	19·73	3·94	32·14	188·92
Nowshera (9 months)	659	-	·15	67·07	·76	2·88	1·52	3·96	1·06	17·90	3·03	27·77	126·10
Peshawur - -	1,720	-	·17	337·79	2·97	8·31	3·90	3·49	5·64	20·41	6·51	39·71	428·90

TABLE showing the PREVALENCE of SMALL-POX in each Month, and the Distribution of the DISEASE by STATIONS & PROVINCES.

STATIONS.	Average Strength for the Period of Occupation.	NUMBER OF ADMISSIONS INTO HOSPITAL IN EACH MONTH.												Total Admissions.	Admitted per Cent. of Average Strength.	Number of Deaths.	Died per 1,000 of Average Strength.
		Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.				
Presidency Hospitals and Chinsurah Depôt	402	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Fort William	745	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dum-Dum (9 months)	648	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Barrackpore	439	-	-	-	-	1	-	-	-	-	-	-	-	1	-	1	-
Berhampore	223	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	1,863	-	-	-	-	1	-	-	-	-	-	-	-	1	·05	1	·53
Darjeeling Depôt (8 months)	155	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Darjeeling	246	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hazareebaugh	730	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dinapore	935	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benares and Raj Ghat	1,210	-	-	-	1	-	1	-	-	-	-	-	-	2	-	1	-
Azinghur and Jounpore	336	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Gondah	815	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Fyzabad	1,073	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Rae Bareilly (10 months)	402	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Lucknow	2,420	-	-	-	1	-	-	-	-	-	-	-	-	1	-	1	-
Seetapore	592	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	8,647	-	-	-	2	-	1	-	-	-	-	-	-	3	·03	2	·23
Allahabad	1,054	-	-	1	7	4	3	-	-	-	-	-	-	15	-	4	-
General Hospital	-	-	-	-	3	-	-	-	-	-	-	-	-	3	-	-	-
Cawnpore	1,162	-	-	-	9	5	3	-	-	-	-	-	-	17	-	2	-
Futtehgurh	507	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Shahjehanpore	539	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bareilly	916	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Nynsee Tal (8 months)	283	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Landour (7 months)	216	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Roorkee	587	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Moradabad	399	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Meerut	2,024	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Delhi	1,066	-	-	-	1	-	-	-	-	-	-	-	-	1	-	-	-
Muttra (10 months)	581	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	9,209	-	-	1	17	12	6	-	-	-	-	-	-	36	·39	6	·65
Agra	1,115	-	1	-	-	-	-	-	-	-	-	-	-	1	-	-	-
Morar	1,192	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Gwalior Citadel	241	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Seepree (8 months)	164	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Jhansi	742	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Nowgong	215	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Saugor	845	-	-	-	1	-	-	1	-	-	-	-	-	2	-	1	-
Nagode	214	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Jubbulpore	820	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	5,493	-	1	-	1	-	-	1	-	-	-	-	-	3	·05	1	·18
Umballa	1,683	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dugshaie (10 months)	825	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Subathoo	860	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Kussowlie (6 months)	242	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Kussowlie Depôt (8 months)	402	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Phillour	90	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Jullundur (11 months)	787	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ferozepore (11 months)	888	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Meean Meer (10 months)	1,363	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Lahore Citadel	153	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Govindghur and Umritsur	400	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Mooltan	1,042	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dera Ismael Khan	96	-	-	-	-	2	-	-	-	-	-	-	-	2	-	-	-
Sealkote (10 months)	1,318	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Kangra	93	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dhurmshalla	13	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Jhelum	74	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Rawul Pindie (8 months)	1,652	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Campbellpore (6 months)	347	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Road-making Detachment	200	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Attock	148	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Nowshera (9 months)	659	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Peshawur	1,720	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Murree (7 months)	363	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cheerat Depôt (5 months)	409	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Eusufzaie Field Force	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Troops and Invalids on the march	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	15,660	-	-	-	-	2	-	-	-	-	-	-	-	2	·01	-	-
BENGAL PRESIDENCY	41,351	-	1	1	20	15	7	1	-	-	-	-	-	45	·11	10	·24

EUROPEAN TROOPS, 1863—continued.

TABLE showing the PREVALENCE of CHOLERA in each Month, and the Distribution of the DISEASE by STATIONS and PROVINCES.

STATIONS.	Average Strength for the Period of Occupation	NUMBER OF ADMISSIONS INTO HOSPITAL IN EACH MONTH.												Total Admissions.	Admitted per Cent. of Average Strength.	Number of Deaths.	Died per 1,000 of Average Strength.
		Jan.	Feb.	March.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.				
Presidency Hospitals and Chinsurah Depôt	402	-	-	-	1	-	-	-	-	-	-	2	1	4	-	4	-
Fort William - -	745	-	-	-	-	-	-	1	-	1	2	1	-	5	-	4	-
Dum-Dum (9 months)	648	-	-	-	1	-	-	-	-	-	-	-	-	1	-	1	-
Barrackpore - -	439	-	-	1	1	-	-	-	-	-	-	-	-	2	-	1	-
Berhampore - -	223	-	1	-	-	-	-	-	-	-	-	-	-	1	-	-	-
	1,893	-	1	1	2	-	-	1	-	1	2	1	-	9	48	6	3.17
Darjeeling Depôt (8 months)	155	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Darjeeling - -	246	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hazareebaugh - -	730	-	-	-	-	-	-	2	1	-	-	-	-	3	-	3	-
Dinapore - -	925	-	-	1	1	-	1	1	-	-	-	-	-	4	-	3	-
Benares and Raj Ghat	1,210	1	-	1	12	-	-	26	2	2	-	-	-	44	-	35	-
Azimghur and Jounpore	936	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Gondah - -	815	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Fyzabad - -	1,073	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Rae Bareilly (10 months)	402	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Lucknow - -	2,420	-	-	-	-	-	-	23	15	1	7	-	-	46	-	25	-
Seetapore - -	592	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	8,647	1	-	2	13	-	1	52	18	3	7	-	-	97	1.12	66	7.63
Allahabad - -	1,054	-	-	-	1	3	-	26	24	-	-	-	-	54	-	44	-
" General Hospital	-	3	-	-	-	-	-	1	3	-	-	-	-	7	-	2	-
Cawnpore - -	1,162	-	-	-	-	-	-	-	10	6	1	-	-	17	-	24*	-
Futtehgurh - -	567	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Shahjehanpore - -	539	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bareilly - -	916	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Nynce Tal (8 months)	283	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Landour (7 months)	216	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Roorkee - -	587	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Moradabad - -	393	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Meerut - -	2,024	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Delhi - -	1,066	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Muttra (10 months)	581	-	-	-	-	-	-	-	2	-	-	-	-	2	-	-	-
	9,209	3	-	-	1	3	-	27	39	6	1	-	-	80	87	70	7.61
Agra - -	1,115	-	-	-	-	-	-	21	11	-	-	-	-	32	-	21	-
Morar - -	1,192	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Gwalior Citadel - -	241	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Seepree (8 months)	164	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Jhansi - -	742	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Nowgong - -	215	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Saugor - -	845	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Nagode - -	214	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Jubbulpore - -	820	-	-	-	-	-	1	-	-	-	-	-	-	1	-	-	-
	5,493	-	-	-	-	-	1	21	11	-	-	-	-	33	60	21	3.82
Umballa - -	1,683	-	-	-	-	-	-	-	1	-	-	-	-	1	-	1	-
Dugshaie (10 months)	825	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Subathoo - -	860	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Kussowlie (6 months)	242	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Kussowlie Depôt	402	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Phillour - -	90	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Jullundur (11 months)	787	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ferozepore (11 months)	838	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Meean Meer (10 months)	1,363	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Lahore Citadel - -	153	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Umritsar & Govindghur	409	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Mooltan - -	1,042	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dera Ismael Khan - -	96	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sealkote (10 months)	1,318	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Kangra - -	93	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dhurmsalla - -	30	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Jhelum - -	74	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Rawul Pindee (8 months)	1,652	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Campbellpore (6 months)	347	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Road-making Detachment	200	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Attock - -	148	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Nowshera (9 months)	659	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Peshawur - -	1,720	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Murree (7 months)	363	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cheerat Depôt (5 months)	409	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Eusufzaie Field Force	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Troops and Invalids on the march - -	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	15,660	-	-	-	-	-	-	-	1	-	1	-	-	2	01	2	13
BENGAL PRESIDENCY	41,351	4	1	3	17	3	2	101	69	10	11	3	1	225	55	169	4.09

* Deaths from Choleraic Diarrhoea have been included in the Mortality from Cholera.

TABLE showing the MORTALITY in each STATION, the CAUSES OF DEATH, and the Ratio of DEATHS to STRENGTH.

STATIONS.	Average Strength for the Period of Occupation.	CAUSES OF DEATHS IN HOSPITAL.																	Number of Deaths.	DIED per 1,000 OF AVERAGE STRENGTH.		
		Cholera.	Small-pox.	Intermittent Fevers.	Remittent Fevers.	Continued Fevers.	Dysentery, Acute.	Dysentery, Chronic.	Diarrhea.	Hepatitis, Acute.	Hepatitis, Chronic.	Phthisis Pulmonalis.	Heat Apoplexy.	Delirium Tremens.	Respiratory Diseases.	Heart Diseases.	All other Diseases.	Wounds and Accidents.		A. Cholera.	B. Other Causes.	C. All Causes.
Presidency Hospitals and Chinsurah Depôt	402	4	-	-	-	1	2	-	1	1	2	10	-	-	1	-	3	-	25	-	-	-
Hospital Ship "Bentineck"	47	-	-	-	-	-	-	4	-	-	1	1	-	-	-	-	3	-	9	-	-	-
Fort William	745	4	-	1	1	3	4	-	1	1	-	-	-	-	1	-	1	-	17	5.37	17.45	22.82
Dum-Dum (9 months)	684	1	-	-	-	-	2	-	-	-	-	-	1	1	-	-	3	-	8	1.54	10.81	12.35
Barrackpore	439	1	1	-	-	1	1	-	-	-	-	1	1	-	-	1	-	9	2.28	18.22	20.50	
Berhampore	223	-	-	-	-	-	1	1	-	1	-	-	-	-	2	-	-	-	5	-	22.42	22.42
	1,893	6	1	1	1	4	8	1	1	2	-	1	2	4	1	1	4	1	39	3.17	17.43	20.60
Darjeeling Depôt (8 months)	155	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	1	-	5	-	-	-
Darjeeling	246	-	-	-	-	-	1	-	-	-	-	1	-	-	-	-	-	1	3	-	12.19	12.19
Hazarcebaugh	730	3	-	1	-	4	3	-	-	2	-	-	-	1	-	-	2	-	16	4.11	17.81	21.92
Dinapore	925	3	-	-	-	-	2	1	-	4	-	-	-	-	1	-	-	-	11	3.24	8.65	11.89
Benares and Raj Ghat	1,210	35	1	-	-	2	-	-	1	2	2	4	-	-	-	-	4	-	51	28.93	13.22	42.15
Azimgur and Jounpore	181	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	2.98	2.98
Gondah	815	-	-	-	2	-	-	-	-	3	-	1	2	1	-	-	1	-	10	-	12.27	12.27
Fyzabad	1,073	-	-	-	-	-	2	-	-	2	4	4	-	1	1	-	1	-	15	-	13.98	13.98
Rae Bareilly (10 months)	402	-	-	-	1	-	-	-	-	-	1	1	-	-	-	-	-	-	3	-	7.46	7.46
Lucknow	2,420	25	1	-	-	-	4	-	1	14	3	4	2	-	8	1	5	1	69	10.33	18.18	28.51
Seetapore	592	-	-	-	1	-	-	-	-	-	-	1	-	-	-	-	2	-	4	-	6.76	6.76
	8,647	66	2	1	5	6	12	1	2	27	13	16	5	2	10	2	16	2	188	7.63	14.14	21.74
Allahabad	1,054	44	4	3	4	-	4	-	2	8	1	6	1	2	2	1	1	-	83	41.75	37.00	78.75
" General Hospital	64	2	-	-	-	-	-	-	1	1	2	4	1	-	-	-	5	-	16	-	-	-
Cawnpore	1,162	24	2	1	1	2	-	-	-	5	1	3	-	2	2	-	3	-	46	20.65	18.94	39.59
Futtehgurh	567	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	4	-	5	-	8.82	8.82
Shahjehanpore	539	-	-	-	2	-	1	-	-	-	-	1	2	-	-	-	1	-	7	-	13.00	13.00
Bareilly	916	-	-	1	-	-	2	1	-	-	1	1	1	-	-	-	4	1	12	-	13.10	13.10
Nynce Tal (8 months)	283	-	-	-	-	-	-	-	5	-	3	1	-	-	-	-	1	-	10	-	-	-
Landour (7 months)	216	-	-	-	-	-	-	2	-	-	3	-	-	-	-	-	-	-	5	-	-	-
Roorkee	587	-	-	1	-	-	2	-	-	1	-	2	-	-	-	-	1	-	7	-	11.92	11.92
Moradabad	393	-	-	-	-	-	-	-	1	-	1	1	-	-	-	-	-	-	3	-	7.63	7.63
Meerut	2,024	-	-	-	1	-	3	7	-	3	5	2	1	-	1	2	2	-	27	-	13.34	13.34
Delhi	1,066	-	-	-	4	3	3	-	3	4	1	4	6	-	2	-	7	1	38	-	35.65	35.65
Muttra (10 months)	581	-	-	-	-	-	1	-	-	1	-	1	-	1	-	-	2	-	6	-	10.33	10.33
	9,209	70	6	6	12	6	16	10	12	23	18	26	12	5	7	3	31	2	265	7.61	21.17	28.78
Agra	1,115	21	-	1	2	4	2	-	-	-	1	1	1	2	2	-	2	-	39	18.83	16.15	34.98
Morar	1,192	-	-	-	-	2	5	1	-	7	-	1	1	1	2	1	1	1	23	-	19.30	19.30
Gwalior Citadel	241	-	-	-	-	-	1	-	-	-	-	-	-	1	1	-	-	4	-	16.60	16.60	
Seepree (8 months)	164	-	-	-	-	1	-	-	2	-	-	-	-	-	-	-	-	4	-	-	-	
Jhansi	742	-	-	1	-	2	2	-	-	1	-	-	-	-	1	1	1	-	9	-	12.13	12.13
Nowgong	215	-	-	-	2	-	-	-	-	1	1	1	1	-	-	-	-	6	-	27.91	27.91	
Saugor	845	-	1	-	1	1	1	-	1	3	1	-	1	-	1	1	3	-	15	-	17.75	17.75
Nagode	214	-	-	-	-	1	1	-	-	-	-	-	-	-	-	1	-	3	-	14.02	14.02	
Jubbulpore	820	-	-	1	1	-	4	-	-	5	-	2	2	-	1	-	1	-	17	-	20.73	20.73
	5,493	21	1	3	6	11	16	1	3	17	3	5	6	4	8	6	8	1	120	3.82	18.03	21.85
Umballa	1,683	1	-	1	-	3	1	-	-	-	3	2	-	1	1	2	4	-	19	.62	10.67	11.29
Dugshaie (10 months)	825	-	-	-	-	6	2	1	1	1	1	-	-	-	-	-	1	-	14	-	16.97	16.97
Subathoo	860	-	-	2	1	4	5	1	2	-	-	2	-	-	-	-	3	1	21	-	24.42	24.42
Kussowlie (6 months)	242	-	-	-	-	-	-	-	-	2	-	-	1	-	-	-	-	3	-	24.79	24.79	
Kussowlie Depôt (8 mths.)	402	-	-	-	-	-	-	1	2	1	-	1	-	-	-	1	4	-	11	-	-	-
Phillour	90	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	1	-	-	-
Jullundur (11 months)	787	-	-	-	-	2	1	-	-	-	1	1	-	-	1	-	-	-	6	-	7.62	7.62
Ferozepore (11 months)	838	-	-	-	-	1	1	-	1	1	2	3	2	-	2	-	-	1	13	-	14.32	14.32
Meean Meer (10 months)	1,363	-	-	2	-	1	2	-	2	3	2	1	-	-	-	-	1	-	15	-	10.27	10.27
Lahore Citadel	153	-	-	1	-	-	1	1	-	-	1	-	-	-	-	-	1	2	8	-	-	-
Umritsur and Govindghur	409	-	-	1	1	1	10	-	1	1	1	2	2	-	-	-	1	-	30	-	73.35	73.35
Mooltan	1,042	-	-	-	2	-	-	-	2	-	2	1	1	4	1	-	1	3	17	-	16.31	16.31
Dera Ismael Khan	96	-	-	1	-	-	-	-	-	-	-	-	1	-	-	-	1	-	3	-	-	-
Sealkote (10 months)	1,318	-	-	-	1	1	-	-	-	5	-	7	2	1	1	-	3	-	21	-	11.38	11.38
Kangra	93	-	-	-	1	-	-	-	-	-	1	-	-	-	-	-	-	2	-	-	-	
Dhumsalla	30	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	2	-	-	-	
Jhelum	74	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Rawul Pindoe (8 months)	1,652	1	-	2	-	-	3	-	3	2	4	1	1	-	1	1	5	-	24	-	5.45	5.45
Campbellpore (6 months)	347	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-
Road-making Detachment	200	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	1	-	-	-
Attock	148	-	-	1	-	-	1	-	-	-	-	-	-	-	-	-	2	-	4	-	-	-
Nowshera (9 months)	659	-	-	-	1	1	1	1	-	-	1	1	1	-	-	-	3	1	12	-	9.10	9.10
Peshawur	1,720	-	-	6	4	3	2	1	-	2	-	4	2	-	1	-	3	1	29	-	16.86	16.86
Murree (7 months)	363	-	-	-	-	1	-	-	-	-	2	1	-	-	1	2	-	1	8	-	-	-
Cheerat Depôt (5 months)	409	-	-	1	1	-	1	-	1	-	-	1	1	-	1	-	2	-	9	-	-	-
Eusufzaie Field Force	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	1	-	-	-
Troops and Invalids on the march	-	-	-	-	-	-	2	-	-	1	-	1	-	1	3	1	-	-	9	-	-	-
	15,060	2	-	19	12	23	42	8	14	22	21	30	20	5	12	13	34	7	284	.13	18.01	18.14
BENGAL PRESIDENCY	41,351	169	10	30	36	51	96	25	33	92	58	89	45	25	39	20	99	13	530	4.09	18.40	22.49

EUROPEAN TROOPS, 1863—continued.

TABLE showing the CAUSES of DEATH and INVALIDING.

TOTAL LOSS TO THE SERVICE BY DEATH AND INVALIDING, 2,483. PER 1,000 OF AVERAGE STRENGTH, 60.05.

NUMBER OF MEN LOST TO THE SERVICE BY DEATH, 1,037.				NUMBER OF MEN LOST TO THE SERVICE BY INVALIDING, 1,446.			
CAUSES OF DEATH.	Died in Hospital.	Died out of Hospital.	Died per 1,000 of Strength.	CAUSES OF INVALIDING.	Invalided for Discharge from the Service.	Invalided for Change of Climate.	Invalided per 1,000 of Strength.
Variola - - - - -	10	- -	24	Tonsillitis - - - - -	-	1	-
Febris Intermittens - - - - -	30	- -	2.82	Febris - - - - -	20	63	2.01
„ Remittens - - - - -	36	- -		Ophthalmia - - - - -	37	38	1.81
„ Continua - - - - -	51	- -		Erysipelas - - - - -	1	-	-
Erysipelas - - - - -	3	-	-	Dysentery - - - - -	5	40	1.50
Pyæmia - - - - -	2	-	-	Diarrhoea - - - - -	2	19	
Dysentery Acuta - - - - -	96	- -	2.94	Rheumatismus - - - - -	128	93	5.47
„ Chronica - - - - -	25	- -		Syphilis - - - - -	29	61	
Diarrhoea - - - - -	33	- -	7.79	Iritis Syphilitica - - - - -	3	-	2.42
Cholera - - - - -	169	- -		Bubo - - - - -	1	2	
Rheumatismus - - - - -	5	-		Stricture Urethrae - - - - -	2	2	-
Syphilis Secundaria - - - - -	8	-	4.00	Purpura - - - - -	-	1	-
Bubo - - - - -	2	-	-	Anæmia - - - - -	7	12	-
Hydrophobia - - - - -	2	-	-	Anasarca - - - - -	-	2	-
Purpura - - - - -	1	-	-	Lupus - - - - -	-	1	-
Ebriositas - - - - -	3	9	-	Obesitas - - - - -	1	-	-
Anæmia - - - - -	4	-	-	Scrofula - - - - -	3	8	-
Anasarca - - - - -	4	-	-	Phthisis Pulmonalis - - - - -	43	40	2.03
Carcinoma - - - - -	1	-	-	Hæmoptysis - - - - -	-	1	
Scrofula - - - - -	2	-	-	Abscessus Psoanus - - - - -	-	1	-
Phthisis Pulmonalis - - - - -	89	- -	2.25	Morbus Coxæ - - - - -	-	1	-
Hæmoptysis - - - - -	4	- -		Apoplexia - - - - -	1	1	-
Meningitis - - - - -	7	-	-	Paralysis - - - - -	8	7	-
Encephalitis - - - - -	4	-	-	Mania - - - - -	8	6	7.2
Apoplexia - - - - -	45	8	1.29	Dementia - - - - -	10	6	
Hemiplegia - - - - -	2	-	-	Epilepsia - - - - -	30	1	7.4
Paralysis - - - - -	4	-	-	Cephalæa - - - - -	2	6	-
Delirium Tremens - - - - -	20	- -	4.8	Neuralgia - - - - -	-	3	-
Epilepsia - - - - -	2	-	-	Otitis - - - - -	2	3	-
Cephalæa - - - - -	1	-	-	Dyseæcia - - - - -	12	5	-
Pericarditis - - - - -	3	-	-	Amaurosis - - - - -	2	2	-
Morbus Cordis - - - - -	16	4	7.9	Nyctalopia - - - - -	1	-	-
Aneurisma - - - - -	7	6		Pericarditis - - - - -	27	28	1.67
Laryngitis - - - - -	2	-	-	Endocarditis - - - - -	3	2	
Bronchitis - - - - -	10	-	-	Aneurisma - - - - -	1	1	-
Pleuritis - - - - -	2	-	-	Angina pectoris - - - - -	3	3	-
Pneumonia - - - - -	20	-	8.9	Palpitatio - - - - -	8	1	-
Asthma - - - - -	3	-		Varix - - - - -	1	2	-
Gastritis - - - - -	2	-	-	Laryngitis - - - - -	14	28	1.22
Enteritis - - - - -	4	-	-	Bronchitis - - - - -	-	1	
Peritonitis - - - - -	2	-	-	Pleuritis - - - - -	1	1	-
Hæmatemesis - - - - -	1	-	-	Pneumonia - - - - -	1	1	-
Splenitis - - - - -	2	-	-	Asthma - - - - -	-	3	-
Hepatitis Acuta - - - - -	92	- -	3.64	Gastritis - - - - -	13	1	-
„ Chronica - - - - -	58	- -		Hernia - - - - -	-	7	-
Icterus - - - - -	3	-	-	Dyspepsia - - - - -	1	-	-
Ascites - - - - -	5	-	-	Colica - - - - -	1	-	-
Nephria - - - - -	5	-	-	Hæmatemesis - - - - -	-	15	-
Calculus Vesicæ - - - - -	1	-	-	Splenitis - - - - -	45	169	5.18
Uræmia - - - - -	1	-	-	Hepatitis - - - - -	1	-	-
Hæmaturia - - - - -	1	-	-	Cirrhosis - - - - -	1	1	-
Synovitis - - - - -	1	-	-	Ascites - - - - -	1	2	-
Morbus Coxæ - - - - -	1	-	-	Nephritis - - - - -	-	1	-
Abscessus - - - - -	2	-	-	Ischuria - - - - -	-	1	-
Asthenia - - - - -	8	-	-	Diabetes - - - - -	-	1	-
Accident - - - - -	3	7	2.23	Cystitis - - - - -	-	1	-
Drowned - - - - -	-	15		Varicocele - - - - -	5	7	-
Suffocated while drunk - - - - -	-	4		Orchitis - - - - -	-	1	-
Fracture - - - - -	2	-	-	Hydrocele - - - - -	-	-	-
Concussion of brain - - - - -	4	-	-	Arthritis - - - - -	1	2	-
Gunshot wounds - - - - -	2	-	-	Synovitis - - - - -	1	4	-
Killed in action - - - - -	-	40	-	Ostitis - - - - -	1	-	-
Poisoning - - - - -	1	-	-	Necrosis - - - - -	6	-	-
Suicide - - - - -	1	13	-	Contractura - - - - -	1	3	-
Found dead; cause of death unknown - - - - -	-	1	-	Abscessus - - - - -	7	14	-
Ratio per 1,000 for Deaths from causes not specially calculated - - - - -	-	-	2.63	Ulcus - - - - -	75	79	3.72
	930	107	25.08	Debilitas (worn out) - - - - -	1	-	-
				Ambustio - - - - -	4	-	-
				Luxatura - - - - -	2	-	-
				Subluxatio - - - - -	5	2	-
				Fractura - - - - -	6	-	61
				Contusio - - - - -	3	-	-
				Vulnus Sclopetarium - - - - -	-	1	-
				„ Incisum - - - - -	1	-	-
				Amputatio - - - - -	-	-	-
				Causes not specified - - - - -	31	-	-
				Ratio per 1,000 for Invaliding from causes not specially calculated - - - - -	-	-	5.78
					600	815	34.97

1864.

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1.—EUROPEAN TROOPS, 1864.

TABLE showing the SICKNESS and MORTALITY among the EUROPEAN TROOPS serving in the BENGAL PRESIDENCY, during the Year 1864, and the Prevalence of the Principal Diseases in each Month of the Year.

MONTHS.	CAUSES OF DEATHS IN HOSPITAL.																											Died out of Hospital.
	Average Strength.	Average Number Daily Sick.	Daily Sick per Cent. of Average Strength.	Number of Deaths.	Died per 1,000 of Average Strength.	Cholera.	Small-pox.	Fever, Intermittent.	Fever, Remittent.	Fever, Continued.	Apoplexy.	Delirium Tremens.	Dysentery, Acute.	Dysentery, Chronic.	Diarrhoea.	Hepatitis, Acute.	Hepatitis, Chronic.	Spleen Disease.	Respiratory Diseases.	Heart Disease.	Phthisis Pulmonalis.	Dropsy.	Scurvy.	Atrophy and Anæmia.	Wounds and Accidents.	All other Causes.		
						103	14	41	52	34	59	16	55	11	27	49	70	2	41	35	65	2	2	14	16	87	57	
Died per 1,000 of Average Strength.																												
For the year	40,385	2,507	6.21	852	21.10	2.55	.35	1.01	1.29	.84	1.46	.40	1.36	.27	.67	1.21	1.74	.05	1.01	.87	1.61	.05	.05	.35	.40	2.15	1.41	

CAUSES OF ADMISSIONS.	NUMBER OF ADMISSIONS INTO HOSPITAL IN EACH MONTH.												Total Admissions during the Year.	Admitted per Cent. of Average Strength.	Died per Cent. of Admissions.	
	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.				
Cholera -	1	5	15	22	5	4	10	6	68	5	6	2	148	.37	69.59	
Small-pox -	3	4	6	5	16	10	2	-	1	-	14	26	87	.22	16.09	
Fever, Intermittent -	920	723	924	1,003	1,691	1,799	1,693	1,802	1,625	1,915	2,504	952	17,551	43.46	} .58	
" Remittent -	15	15	39	71	111	230	223	209	355	198	117	84	1,667	4.13		
" Continued -	55	64	130	213	421	582	381	281	150	116	174	114	2,681	6.64		
Apoplexy -	-	2	6	3	5	29	27	7	4	-	4	3	90	.22	67.78	
Delirium Tremens -	8	11	15	12	22	20	4	6	12	12	16	7	145	.36	11.04	
Dysentery -	77	71	67	77	132	98	105	176	179	143	186	129	1,440	3.57	4.58	
Diarrhoea -	144	134	257	309	320	314	304	724	575	306	361	218	3,966	9.82	.68	
Hepatitis -	131	160	197	193	255	205	212	253	208	151	181	127	2,273	5.63	5.24	
Spleen Disease -	21	20	41	44	40	39	31	45	47	26	34	21	409	1.01	.50	
Respiratory Diseases -	244	252	337	268	327	246	175	362	228	230	288	259	3,216	7.96	1.28	
Phthisis Pulmonalis -	17	12	20	19	36	24	35	35	31	36	28	25	318	.79	20.44	
Scurvy -	1	1	5	3	4	7	1	8	5	1	1	3	35	.09	5.72	
Rheumatism -	248	234	342	273	371	256	255	388	250	251	273	254	3,395	8.41	} .48	
General Diseases -	928	1,012	1,173	1,036	1,071	775	617	774	664	620	847	778	10,295	25.49		
Eye Diseases -	119	129	191	192	178	147	104	154	167	131	140	82	1,734	4.29		
Dyscess and Ulcer -	340	382	517	443	546	476	554	489	407	311	481	320	5,266	13.04		
Wounds and Accidents -	314	313	482	418	405	333	228	329	319	346	416	343	4,246	10.51		
All other Causes -	376	467	653	625	780	679	671	860	652	543	570	455	7,331	18.15		
													66,293			
Admitted per Cent. of Average Strength in each Month.																
10.01	9.98	13.55	12.80	16.49	15.42	13.84	17.03	14.81	13.37	16.32	10.39	164.16				

1.—EUROPEAN TROOPS, 1864—*continued.*

TABLE showing the SICKNESS and MORTALITY among the EUROPEAN TROOPS serving in BENGAL PROPER, during the Year 1864,
and the Prevalence of the Principal Diseases in each Month of the Year.

MONTHS.	CAUSES OF DEATHS IN HOSPITAL.																												
	Average Strength.	Average Number Daily Sick.	Daily Sick per Cent. of Average Strength.	Number of Deaths.	Died per 1,000 of Average Strength.	Cholera.	Small-pox.	Fever, Intermittent.	Fever, Remittent.	Fever, Continued.	Apoplexy.	Delirium Tremens.	Dysentery, Acute.	Dysentery, Chronic.	Diarrhoea.	Hepatitis, Acute.	Hepatitis, Chronic.	Spleen Disease.	Respiratory Diseases.	Heart Disease.	Phthisis Pulmonalis.	Dropsy.	Scurvy.	Atrophy and Anemia.	Wounds and Accidents.	All other Causes.	Died out of Hospital.		
January	1,996	90	4.51	1	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
February	1,698	117	6.89	2	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
March	1,903	126	6.62	4	-	1	-	-	1	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-		
April	2,156	117	5.43	4	-	2	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
May	2,044	115	5.63	2	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-		
June	2,040	128	6.27	6	-	-	-	-	1	-	-	-	2	-	-	-	-	-	-	-	1	-	-	-	-	-	-		
July	2,021	164	8.11	4	-	-	-	-	-	1	-	-	1	-	-	1	-	-	-	-	-	1	-	-	-	-	-		
August	2,026	152	7.50	3	-	-	-	-	1	-	-	1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
September	2,035	137	6.73	5	-	-	-	-	1	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-		
October	1,818	134	7.37	9	-	1	-	-	-	2	-	-	1	-	-	-	-	-	-	-	1	-	-	-	-	2	-		
November	1,655	93	5.62	8	-	-	-	-	-	1	-	-	2	-	-	2	-	-	-	-	-	-	-	2	-	1	-		
December	2,628	128	4.87	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-		
						5	-	1	4	5	1	1	7	-	1	3	2	-	-	-	4	1	-	3	-	3	9		
						Died per 1,000 of Average Strength.																							
For the year	2,002	124	6.19	50	24.98	2.50	-	.50	2.00	2.50	.50	.50	3.49	-	.50	1.50	1.00	-	-	-	2.00	.50	-	1.50	-	1.50	4.25		

CAUSES OF ADMISSIONS.	NUMBER OF ADMISSIONS INTO HOSPITAL IN EACH MONTH.												Total Admissions during the Year.	Admitted per Cent. of Average Strength.	Died per Cent. of Admissions.
	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.			
Cholera	-	3	1	4	1	-	-	-	-	1	-	2	12	.60	41.67
Small-pox	-	-	2	-	-	-	-	-	-	-	-	1	3	.15	-
Fever, Intermittent	26	17	22	23	38	50	104	80	39	32	12	43	486	24.27	-
" Remittent	-	-	3	8	6	39	34	36	67	21	13	18	237	11.84	1.18
" Continued	7	4	8	8	7	12	18	18	17	7	11	6	123	6.14	-
Apoplexy	-	-	-	1	-	1	-	-	-	-	1	-	79	.15	33.33
Delirium Tremens	-	-	-	1	3	-	-	1	1	-	-	1	3	.35	14.29
Dysentery	-	6	6	5	11	12	3	10	5	4	4	13	7	3.95	8.86
Diarrhoea	16	16	40	16	17	17	21	29	15	15	31	47	280	13.99	.36
Hepatitis	7	2	7	7	14	4	8	6	3	3	4	6	76	3.80	6.58
Spleen Disease	1	2	2	3	2	2	-	2	2	2	-	1	19	.95	-
Respiratory Diseases	4	9	10	15	21	11	5	11	12	7	10	13	128	6.39	-
Phthisis Pulmonalis	-	2	-	-	1	-	1	-	4	-	-	3	11	.55	36.36
Scurvy	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Rheumatism	8	19	12	9	19	13	9	16	8	14	9	18	154	7.69	-
Veneral Diseases	51	50	54	41	45	52	47	37	41	25	28	76	547	27.32	-
Eye Diseases	8	5	9	7	9	12	8	6	3	4	3	9	83	4.15	-
Abscess and Ulcer	17	10	15	14	14	11	19	17	12	16	26	24	195	9.74	.45
Wounds and Accidents	12	11	23	17	10	12	8	19	12	18	15	20	177	8.84	-
All other Causes	17	20	39	38	40	35	37	37	41	34	34	33	405	20.23	-
	176	176	253	217	258	283	322	327	275	203	201	334	3,025		
	Admitted per Cent. of Average Strength in each Month.														
	8.82	10.37	13.29	10.07	12.62	13.87	15.93	16.14	13.51	11.17	12.14	12.71	151.10		

Ten men belonging to Regiments stationed in Lower Bengal died on board the "Bentinck," and in the Kidderpore Hospital. If these deaths be included, the death-rate of the year will be 29·98 per 1,000.

I.—EUROPEAN TROOPS, 1864—continued.

TABLE showing the SICKNESS and MORTALITY among the EUROPEAN TROOPS serving in the *Dinapore, Benares, Oude, and Cawnpore Districts*, during the Year 1864, and the Prevalence of the Principal Diseases in each month of the Year.

MONTHS.	CAUSES OF DEATHS IN HOSPITAL.																										
	Average Strength.	Average Number Daily Sick.	Daily Sick per Cent. of Average Strength.	Number of Deaths.	Died per 1,000 of Average Strength.	Cholera.	Small-pox.	Fever, Intermittent.	Fever, Remittent.	Fever, Continued.	Apoplexy.	Delirium Tremens.	Dysentery, Acute.	Dysentery, Chronic.	Diarrhea.	Hepatitis, Acute.	Hepatitis, Chronic.	Spleen Disease.	Respiratory Diseases.	Heart Diseases.	Phthisis Pulmonalis.	Dropsy.	Scurvy.	Atrophy and Anemia.	Wounds and Accidents.	All other Causes.	Died out of Hospital.
January -	9,993	475	4.75	8	-	-	-	-	-	-	-	-	-	-	-	-	1	-	1	2	1	-	-	-	-	1	2
February -	10,499	573	5.46	8	-	-	-	1	1	-	1	1	1	1	-	3	-	-	2	1	1	-	-	-	-	2	1
March -	10,212	640	6.27	12	-	2	-	-	-	-	-	-	-	-	-	-	-	-	2	1	1	-	-	-	-	1	1
April -	10,741	722	6.72	11	-	2	1	1	-	1	-	-	1	-	1	-	1	-	2	1	1	-	-	-	-	-	1
May -	10,887	722	6.63	16	-	2	1	-	-	1	-	-	2	-	-	-	1	-	1	2	1	-	-	-	-	4	1
June -	10,823	709	6.55	30	-	2	2	1	2	1	13	1	1	1	-	1	-	-	1	2	2	-	-	-	-	2	2
July -	10,929	694	6.35	27	-	6	1	-	-	2	8	-	1	-	-	2	2	-	1	1	3	-	-	-	-	2	1
August -	10,882	687	6.31	29	-	5	-	1	6	-	2	1	-	-	1	2	-	-	1	5	5	-	1	-	-	2	2
September -	10,783	765	7.09	80	-	49	-	-	7	2	1	1	2	-	3	2	2	-	3	-	3	-	-	-	-	3	2
October -	10,735	649	6.05	19	-	1	-	-	2	-	-	2	3	-	2	5	1	-	-	-	1	-	-	-	-	2	-
November -	8,877	420	4.73	19	-	1	-	-	4	3	-	-	3	-	2	2	-	-	-	-	1	-	-	-	2	1	-
December -	8,604	389	4.52	15	-	-	-	-	4	-	-	-	3	-	-	-	1	-	3	1	-	-	-	-	1	1	1
						70	5	4	27	10	25	6	16	1	9	16	9	-	13	8	18	-	-	1	3	21	12
Died per 1,000 of Average Strength.																											
For the year	10,333	619	5.99	274	26.52	6.67	.49	.39	2.61	.96	2.42	.58	1.55	.10	.87	1.55	.87	-	1.26	.78	1.74	-	-	.10	.29	2.03	1.16

CAUSES OF ADMISSIONS.	NUMBER OF ADMISSIONS INTO HOSPITAL IN EACH MONTH.												Total Admissions during the Year.	Admitted per Cent. of Average Strength.	Died per Cent. of Admissions.
	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.			
Cholera -	-	-	2	2	2	2	9	6	66	2	-	-	91	.88	76.92
Small-pox -	-	-	1	1	6	6	1	-	-	-	-	-	15	.15	33.33
Fever, Intermittent -	105	94	144	157	187	242	221	308	296	172	153	70	2,149	20.79	1.27
" Remittent -	3	8	15	23	31	88	108	115	138	67	47	17	660	6.39	
" Continued -	6	10	19	48	82	97	46	38	23	14	18	26	427	4.13	
Apoplexy -	-	-	2	1	2	16	6	2	1	-	-	-	30	.29	83.33
Delirium Tremens -	4	3	5	3	4	2	-	1	4	5	6	3	40	.39	15.00
Dysentery -	15	17	24	20	31	24	26	60	75	47	39	40	418	4.05	4.07
Diarrhœa -	34	38	71	127	93	93	92	248	264	77	79	52	1,268	12.27	.71
Hepatitis -	19	29	33	38	51	47	37	68	53	52	42	21	490	4.74	5.10
Spleen Disease -	4	2	6	5	5	4	2	10	4	6	4	1	53	.51	-
Respiratory Diseases -	65	51	78	71	85	49	51	91	60	50	51	69	771	7.46	1.69
Phthisis Pulmonalis -	4	1	7	2	17	12	19	15	9	16	3	1	106	1.03	17.00
Scurvy -	1	-	1	1	-	1	-	-	-	-	1	-	5	.05	-
Rheumatism -	51	43	85	73	94	73	72	117	75	78	65	42	868	8.40	.40
Venereal Diseases -	275	242	359	249	321	196	140	225	161	186	196	188	2,738	26.50	
Eye Diseases -	32	24	56	44	44	26	31	53	50	33	22	22	437	4.23	
Abscess and Ulcer -	91	80	127	115	145	164	150	120	126	68	110	58	1,354	13.10	.40
Wounds and Accidents -	60	68	132	101	115	83	45	68	76	70	81	61	960	9.29	
All other Causes -	79	89	162	156	209	185	190	239	163	140	94	85	1,791	17.33	
	848	799	1,329	1,237	1,524	1,410	1,246	1,784	1,644	1,083	1,011	756	14,671		
Admitted per Cent. of Average Strength in each Month.															
	8.49	7.61	13.01	11.52	14.00	13.03	11.40	16.39	15.25	10.09	11.39	8.78	141.98		

I.—EUROPEAN TROOPS, 1864—continued.

TABLE showing the SICKNESS and MORTALITY among the EUROPEAN TROOPS serving in the Meerut and Rohilcund Districts, during the Year 1864, and the Prevalence of the Principal Diseases in each Month in the Year.

MONTHS.	Average Strength.	Average Number Daily Sick.	Daily Sick per Cent. of Average Strength.	Number of Deaths.	Died per 1,000 of Average Strength.	CAUSES OF DEATHS IN HOSPITAL.																Died out of Hospital.					
						Cholera.	Small-pox.	Fever, Intermittent.	Fever, Remittent.	Fever, Continued.	Apoplexy.	Delirium Tremens.	Dysentery, Acute.	Dysentery, Chronic.	Diarrhoea.	Hepatitis, Acute.	Hepatitis, Chronic.	Spleen Disease.	Respiratory Diseases.	Heart Diseases.	Phthisis Pulmonalis.		Dropsy.	Scurvy.	Atrophy and Anæmia.	Wounds and Accidents.	All other Cases.
January	4,913	266	5.41	5	—	—	—	—	—	—	—	—	—	—	1	—	2	—	—	—	—	—	—	—	—	—	—
February	5,633	343	6.09	2	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—	1
March	5,853	405	6.92	7	—	—	—	—	—	—	—	—	—	—	1	—	3	—	—	—	—	—	—	—	—	—	1
April	6,194	463	7.47	3	—	—	—	—	—	—	—	—	—	—	—	1	3	—	—	—	—	—	—	—	—	—	2
May	6,283	549	8.74	5	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1
June	6,256	521	8.33	16	—	1	—	—	2	—	1	3	—	—	—	1	1	—	—	—	—	—	—	—	—	1	3
July	6,238	438	7.02	16	—	—	—	—	—	1	—	4	—	—	—	—	—	—	—	—	—	—	—	—	—	—	6
August	6,208	480	7.73	7	—	—	—	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	1
September	6,193	515	8.31	8	—	—	—	2	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1
October	6,159	453	7.35	8	—	—	—	—	—	—	—	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	1
November	5,792	401	6.92	12	—	—	1	2	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1
December	5,678	287	5.06	11	—	—	2	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1
						1	3	7	5	3	8	—	6	2	4	2	22	—	8	2	6	—	—	—	2	19	5
Died per 1,000 of Average Strength.																											
for the Year	5,950	431	7.24	105	17.65	16	51	118	84	51	134	—	101	34	67	34	369	—	134	34	101	—	—	—	34	319	84

CAUSES OF ADMISSIONS.	NUMBER OF ADMISSIONS INTO HOSPITAL IN EACH MONTH.												Total Admissions during the Year.	Admitted per Cent. of Average Strength.	Died per Cent. of Admissions.
	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.			
Cholera	—	—	—	—	—	1	—	—	—	—	—	—	1	0.2	—
Small-pox	—	—	—	—	—	—	—	—	1	—	—	15	20	0.33	15.00
Fever, Intermittent	66	95	166	206	282	200	173	224	193	145	148	70	1,968	33.08	56
Fever, Remittent	2	2	13	19	43	28	22	16	22	13	25	14	219	3.68	
Fever, Continued	17	12	26	50	78	81	58	32	27	38	63	29	511	8.58	
Apoplexy	—	—	1	—	—	3	5	1	—	—	—	1	13	0.22	61.54
Delirium Tremens	—	—	—	1	1	3	—	—	1	1	—	—	7	0.12	0.00
Dysentery	7	8	10	17	27	18	19	21	15	15	29	15	201	3.38	3.98
Diarrhoea	10	9	12	41	58	50	37	91	58	58	44	17	485	8.15	0.82
Hepatitis	25	21	34	40	42	39	44	39	40	18	34	20	396	6.66	6.06
Spleen Disease	3	3	5	5	4	5	7	6	8	—	6	5	57	0.96	0.00
Respiratory Diseases	21	33	39	28	43	41	29	47	41	40	40	41	443	7.44	1.81
Phthisis Pulmonalis	1	2	1	5	4	2	3	3	3	3	1	—	28	0.48	21.43
Scurvy	—	—	1	—	2	—	—	1	—	—	—	1	5	0.09	—
Neumatism	27	29	44	49	76	36	38	51	31	22	31	35	469	7.88	40
Mercurial Diseases	156	176	204	235	187	128	108	170	144	117	164	107	1,896	31.86	
Heart Diseases	14	22	35	45	31	24	19	27	22	22	30	9	300	5.04	
Ulcers and Ulcer	59	95	148	107	140	92	110	110	102	85	92	32	1,222	20.54	
Wounds and Accidents	40	39	68	78	53	45	35	57	34	49	56	56	610	10.25	
Other Causes	58	57	94	81	116	125	111	164	136	106	89	55	1,192	20.03	
	506	603	901	1,008	1,187	921	818	1,060	879	732	856	572	10,043		
Admitted per Cent. of Average Strength in each Month.															
	10.30	10.70	15.39	16.27	18.89	14.72	13.11	17.07	14.19	11.88	14.78	10.08	168.79		

I.—EUROPEAN TROOPS, 1864—continued.

TABLE showing the SICKNESS and MORTALITY among the EUROPEAN TROOPS serving in the Agra District and in Central India, during the Year 1864, and the Prevalence of the Principal Diseases in each Month of the Year.

MONTHS.	Average Strength.	Average Number Daily Sick.	Daily Sick per Cent. of Average Strength.	Number of Deaths.	Died per 1,000 of Average Strength.	CAUSES OF DEATHS IN HOSPITAL.																					
						Cholera.	Small-pox.	Fever, Intermittent.	Fever, Remittent.	Fever, Continued.	Apoplexy.	Delirium Tremens.	Dysentery, Acute.	Dysentery, Chronic.	Diarrhoea.	Hepatitis, Acute.	Hepatitis, Chronic.	Spleen Disease.	Respiratory Diseases.	Heart Diseases.	Phthisis Pulmonalis.	Dropsy.	Scurvy.	Atrophy and Anæmia.	Wounds and Accidents.	All other Causes.	
January -	5,102	276	5·41	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-
February -	5,164	309	5·99	5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
March -	5,075	321	6·32	4	-	-	-	1	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-
April -	5,029	336	6·68	6	-	-	-	1	1	1	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-
May -	5,027	352	7·00	5	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-
June -	5,009	345	6·89	14	-	-	-	-	1	-	2	4	1	-	-	-	-	-	1	-	-	-	-	-	-	-	-
July -	4,945	308	6·23	3	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
August -	4,941	317	6·42	6	-	-	-	-	1	-	-	-	-	5	-	-	-	-	-	-	-	-	-	-	-	-	-
September -	4,931	343	6·95	11	-	1	-	-	1	-	1	1	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-
October -	4,702	307	6·53	9	-	2	-	-	-	1	-	-	1	-	-	-	-	-	2	-	-	-	-	-	-	-	-
November -	4,165	289	6·94	8	-	-	-	-	1	1	-	-	-	-	-	-	-	-	2	-	1	-	-	-	-	-	-
December -	4,154	255	6·14	11	-	-	-	-	-	2	-	-	2	-	2	2	-	-	1	-	-	-	-	-	1	-	-
						3	3	5	4	3	5	2	12	-	3	8	4	-	3	4	4	-	-	-	3	14	-

Died per 1,000 of Average Strength.

For the Year	4,854	313	6·45	84	17·31	·62	·62	1·03	·82	·62	1·03	·41	2·48	-	·62	1·65	·82	-	·62	·82	·82	-	-	-	·62	2·88	-
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CAUSES OF ADMISSIONS.	NUMBER OF ADMISSIONS INTO HOSPITAL IN EACH MONTH.												Total Admissions during the Year.	Admitted per Cent. of Average Strength.	Died per Cent. of Admissions.
	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.			
Cholera -	-	-	-	-	-	1	1	-	1	1	-	-	4	·08	75·00
Small-pox -	3	4	3	4	10	4	1	-	-	-	1	1	31	·64	9·68
Fever, Intermittent -	98	92	114	140	244	234	156	235	268	459	515	231	2,786	57·40	·37
" Remittent -	-	-	2	8	9	1	1	2	2	4	7	7	43	·89	
" Continued -	12	18	28	28	47	80	49	30	43	28	26	28	417	8·59	55·56
Apoplexy -	-	1	1	-	-	4	-	1	2	-	-	-	9	·18	
Delirium Tremens -	-	3	1	-	5	5	-	1	4	1	3	1	24	·50	8·33
Dysentery -	8	8	5	7	6	11	16	33	23	12	24	12	165	3·39	7·27
Diarrhoea -	11	14	15	11	18	31	41	134	96	56	52	23	502	10·34	·60
Hepatitis -	14	24	21	20	25	18	19	16	20	15	9	9	210	4·32	5·71
Spleen Disease -	6	9	14	8	7	7	6	9	12	3	7	6	94	1·94	·00
Respiratory Diseases -	32	38	59	44	46	27	20	29	21	29	39	28	412	8·49	·72
Phthisis Pulmonalis -	3	-	2	2	5	2	-	4	-	5	1	-	24	·50	16·67
Scurvy -	-	-	-	-	1	2	1	-	-	-	-	2	6	·12	-
Rheumatism -	45	47	66	36	47	40	45	55	45	42	41	26	535	11·02	·48
Veneral Diseases -	114	158	177	153	170	103	96	92	96	84	100	105	1,448	29·83	
Eye Diseases -	4	11	27	20	22	11	10	17	29	15	9	10	185	3·81	14·26
Abscess and Ulcer -	48	59	80	63	73	55	67	48	49	47	67	36	692	14·26	
Wounds and Accidents -	41	47	61	48	49	43	23	38	45	40	45	36	516	10·63	20·13
All other Causes -	60	84	100	95	100	98	78	96	70	72	68	56	977	20·13	
	499	617	776	687	884	777	630	840	826	913	1,014	617	9,080		
Admitted per Cent. of Average Strength in each Month.															
	9·78	11·95	15·29	13·66	17·58	15·51	12·74	17·00	16·75	19·42	24·35	14·85	187·06		

I.—EUROPEAN TROOPS, 1864—continued.

TABLE showing the SICKNESS and MORTALITY among the EUROPEAN TROOPS serving in the Punjab, during the Year 1864, and the Prevalence of the Principal Diseases in each Month of the Year.

MONTHS.	Average Strength.	Average Number Daily Sick.	Daily Sick per Cent. of Average Strength.	Number of Deaths.	Died per 1,000 of Average Strength.	CAUSES OF DEATHS IN HOSPITAL																					
						Cholera.	Small-pox.	Fever, Intermittent.	Fever, Remittent.	Fever, Continued.	Apoplexy.	Delirium Tremens.	Dysentery, Acute.	Dysentery, Chronic.	Diarrhea.	Hepatitis, Acute.	Hepatitis, Chronic.	Spleen Disease.	Respiratory Diseases.	Heart Diseases.	Phthisis Pulmonalis.	Dropsy.	Scurvy.	Atrophy and Anemia.	Wounds and Accidents.	All other Causes.	Died out of Hospital.
January	16,399	712	4.34	13	-	-	-	-	-	-	-	1	1	1	-	1	1	-	1	1	-	-	-	2	-	-	2
February	15,911	793	4.98	9	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
March	16,014	816	5.09	13	-	-	-	-	-	-	1	-	-	-	-	3	-	1	2	2	-	-	-	1	-	-	1
April	16,093	831	5.16	8	-	-	1	-	1	-	-	1	-	-	-	-	3	-	-	-	-	-	-	-	-	-	1
May	16,336	961	5.88	15	-	1	-	-	-	-	-	-	2	1	-	-	1	2	-	-	-	-	-	-	-	-	2
June	16,275	1,031	6.34	28	-	-	3	1	3	1	2	2	1	1	1	1	1	1	2	2	2	-	-	-	1	3	1
July	16,283	1,100	6.76	32	-	-	1	1	2	11	2	2	2	1	1	1	1	1	2	2	2	-	1	-	1	2	3
August	16,196	1,008	6.23	30	-	-	-	1	1	1	1	1	1	-	1	2	7	-	2	1	4	-	1	-	1	5	2
September	15,994	1,056	6.60	18	-	-	2	1	2	-	-	-	-	1	-	-	1	2	2	2	1	-	-	-	1	1	5
October	15,884	961	6.05	24	-	-	3	1	-	-	-	-	1	-	2	1	4	-	3	1	3	-	-	1	1	3	2
November	14,895	792	5.32	19	-	-	3	-	-	-	1	-	2	1	-	4	2	-	1	1	1	-	-	-	-	2	2
December	14,346	640	4.46	22	-	-	-	1	-	-	-	-	2	2	-	-	3	-	-	2	3	-	-	2	-	2	1
						1	3	14	7	9	15	7	13	8	8	15	26	1	15	14	17	-	2	9	5	21	21
Died per 1,000 of Average Strength.																											
for the Year	15,886	891	5.61	231	14.54	0.6	.19	.88	.44	.57	.95	.44	.82	.50	.50	.94	1.64	.06	.95	.88	1.07	-	.13	.57	.31	1.32	1.32

CAUSES OF ADMISSIONS.	NUMBER OF ADMISSIONS INTO HOSPITAL IN EACH MONTH.												Total Admissions during the Year.	Admitted per Cent. of Average Strength.	Died per Cent. of Admissions.
	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.			
Cholera	-	-	-	-	1	-	-	-	-	-	-	-	1	-	-
Small-pox	-	-	-	-	-	-	-	-	-	-	7	7	14	.09	21.43
Fever, Intermittent	620	418	466	475	934	1,065	1,035	945	819	1,093	1,538	466	9,874	62.16	.26
„ Remittent	6	5	5	13	22	70	51	39	130	93	11	7	452	2.84	
„ Continued	9	18	40	71	190	302	209	155	36	27	43	19	1,119	7.04	
Apoplexy	-	-	2	-	3	3	16	3	-	-	1	-	28	.18	53.57
Delirium Tremens	4	4	7	6	9	10	4	3	2	5	4	2	60	.38	11.67
Dysentery	41	24	19	24	55	29	40	49	58	60	62	27	488	3.07	4.30
Diarrhoea	62	37	70	99	129	117	111	204	136	93	88	37	1,183	7.45	.68
Hepatitis	54	78	94	84	115	94	100	117	86	58	63	48	991	6.24	4.14
Spleen Disease	5	4	14	21	22	20	16	18	21	15	11	4	171	1.08	.58
Respiratory Diseases	110	111	144	103	129	113	68	176	91	95	104	77	1,321	8.32	1.13
Phthisis Pulmonalis	1	4	6	6	9	6	11	10	13	11	5	5	87	.55	19.54
Scurvy	-	1	3	2	1	4	-	2	5	-	-	-	18	.11	11.11
Rheumatism	104	81	116	98	131	90	85	140	88	89	94	98	1,214	7.64	.44
General Diseases	294	349	357	340	334	282	219	234	205	164	222	195	3,195	20.11	
Eye Diseases	56	63	58	73	70	74	36	50	62	55	47	18	662	4.17	
Wounds and Ulcer	106	131	134	138	167	147	205	191	114	89	138	89	1,649	10.38	.44
Wounds and Accidents	153	142	185	169	169	150	116	145	151	160	188	146	1,874	11.79	
All other Causes	120	181	209	238	307	229	251	114	228	177	190	135	2,579	16.23	
	1,745	1,651	1,929	1,960	2,797	2,805	2,573	2,795	2,245	2,284	2,816	1,380	26,980		
Admitted per Cent. of Average Strength in each Month.															
	10.64	10.38	12.05	12.18	17.12	17.23	15.80	17.26	14.04	14.38	18.91	9.62	169.83		

COMPARATIVE STATEMENT of the Ratios of SICKNESS and MORTALITY among the EUROPEAN TROOPS serving in the various PROVINCES of the Bengal Presidency. during the Year 1864.

	BENGAL PROPER.				DINAPORE, BENARES, OUDE, AND CAWNPORE.				MEERUT AND ROHILCUND.				AGRA AND CENTRAL INDIA.				PUNJAB.				BENGAL PRESIDENCY.			
	Average Strength -	Daily Sick per Cent. of Strength -	Admitted per Cent. of Strength -	Died per 1,000 of Strength -	Average Strength -	Daily Sick per Cent. of Strength -	Admitted per Cent. of Strength -	Died per 1,000 of Strength -	Average Strength -	Daily Sick per Cent. of Strength -	Admitted per Cent. of Strength -	Died per 1,000 of Strength -	Average Strength -	Daily Sick per Cent. of Strength -	Admitted per Cent. of Strength -	Died per 1,000 of Strength -	Average Strength -	Daily Sick per Cent. of Strength -	Admitted per Cent. of Strength -	Died per 1,000 of Strength -	Average Strength -	Daily Sick per Cent. of Strength -	Admitted per Cent. of Strength -	Died per 1,000 of Strength -
D I S E A S E S.																								
Cholera	60	41.67	2.50	6.77	76.92	88	02	16	08	62	06	37	69.59	2.55	15,886	40.385	37	69.59	2.55	15,886	40.385	37	69.59	2.55
Small-pox	15	-	-	49	33.33	15	33	51	64	62	19	22	16.09	35	5.61	164.16	22	16.09	35	5.61	164.16	22	16.09	35
Fevers, Intermittent	24.27	1.18	5.50	39	20.79	20.79	33.08	1.18	57.40	1.03	88	43.46	58	1.01	169.83	2.55	43.46	58	1.01	169.83	2.55	43.46	58	1.01
Fevers, Remittent and Continued	17.98	4.50	4.50	3.57	10.52	10.52	12.26	1.35	9.48	1.44	1.01	10.77	2.13	1.63	1.63	1.63	1.01	10.77	2.13	1.63	1.63	1.01	10.77	2.13
Apoplexy	15	33.33	5.50	2.42	83.33	29	22	1.34	18	1.03	95	22	67.78	1.46	5.05	5.05	22	67.78	1.46	5.05	5.05	22	67.78	1.46
Delirium Tremens	35	14.29	5.50	58	15.00	39	12	-	50	41	44	36	11.04	40	1.19	1.19	36	11.04	40	1.19	1.19	36	11.04	40
Dysentery	3.95	8.86	3.49	1.65	4.07	4.05	3.38	1.35	3.39	2.48	1.32	3.57	4.58	1.63	1.63	1.63	3.57	4.58	1.63	1.63	1.63	3.57	4.58	1.63
Diarrhea	13.99	36	5.50	87	12.27	71	8.15	67	10.34	62	50	9.82	68	67	5.05	5.05	9.82	68	67	5.05	5.05	9.82	68	67
Hepatitis	3.80	6.58	2.50	2.42	5.10	4.74	6.66	4.03	4.32	2.47	2.58	5.63	5.24	2.95	2.95	2.95	5.63	5.24	2.95	2.95	2.95	5.63	5.24	2.95
Spleen Disease	95	-	-	-	51	51	96	-	1.94	-	06	01	50	05	-	-	01	50	05	05	-	-	01	50
Respiratory Disease	6.39	-	-	1.26	7.46	7.46	7.44	1.34	8.49	62	95	7.96	1.28	1.01	1.19	1.19	7.96	1.28	1.01	1.01	1.19	7.96	1.28	1.01
Phthisis Pulmonalis	55	36.36	2.00	1.74	17.00	1.03	48	1.01	50	82	1.07	79	20.44	1.61	3.32	3.32	79	20.44	1.61	1.61	3.32	79	20.44	1.61
Scurvy	-	-	-	-	05	05	09	-	12	-	13	09	5.72	05	-	-	09	5.72	05	05	-	-	09	5.72
Rheumatism	7.69	-	-	-	8.40	8.40	7.88	-	11.02	-	-	8.41	-	-	3.81	3.81	8.41	-	-	-	3.81	-	-	-
Veneral Diseases	27.32	-	-	-	26.50	26.50	31.86	-	29.83	-	-	25.49	-	-	2.38	2.38	25.49	-	-	-	2.38	-	-	-
Eye Diseases	4.15	45	3.50	2.91	4.23	4.23	5.04	3.53	3.81	3.70	2.77	4.29	4.48	3.42	2.05	2.05	4.29	4.48	3.42	3.42	2.05	4.29	4.48	3.42
Abscess and Ulcer	9.74	-	-	-	13.10	13.10	20.54	-	14.26	-	-	13.04	-	-	-	-	13.04	-	-	-	-	-	13.04	-
Wounds and Accidents	8.84	-	-	29	9.29	9.29	10.25	34	10.63	62	31	10.51	40	1.12	1.12	1.12	10.51	40	1.12	1.12	1.12	10.51	40	1.12
All other Causes	20.23	-	-	-	17.33	17.33	20.03	-	20.13	-	-	18.15	-	-	-	-	18.15	-	-	-	-	-	18.15	-
Died out of Hospital	-	-	4.49	1.16	-	-	-	84	-	83	1.32	-	-	1.41	-	-	-	-	-	1.41	-	-	-	-
	151.10	-	24.98	26.52	141.98	141.98	168.79	17.65	187.06	17.31	14.54	164.16	-	21.10	36.75	36.75	164.16	-	21.10	36.75	36.75	164.16	-	21.10

TABLE showing the GENERAL STATISTICS of SICKNESS and MORTALITY in the PRINCIPAL MILITARY STATIONS of the Bengal Presidency.

STATIONS.	Period of Observation.	Average Strength during Period of Observation.	DAILY SICK PER CENT. OF AVERAGE STRENGTH IN EACH MONTH.												Daily Sick per Cent. of Average Strength for the Period of Observation.	DIED PER 1,000 OF AVERAGE STRENGTH.				
			Jan.	Feb.	March.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.		Admitted per Cent. of Average Strength.	A. Cholera.	B. All other Causes.		C. All Causes.
																		1. In Hospital.	2. Out of Hospital.	
Fort William	-	790	4.35	8.37	10.44	10.23	8.42	9.61	13.07	11.57	7.74	7.84	5.02	5.03	180.00	2.53	13.93	5.06	21.32	
Dum-Dum	-	592	4.45	6.15	4.61	3.98	3.78	3.39	3.43	3.33	4.50	4.52	5.02	4.95	107.43	1.69	8.93	8.44	16.39	
Barrackpore	-	455	4.84	4.98	3.36	2.32	3.96	3.66	3.59	3.32	5.97	9.11	8.39	5.88	153.63	4.40	32.96	2.20	39.56	
9 Months, April to December	-	292	-	-	-	3.21	3.63	3.07	1.66	1.77	1.77	1.82	1.86	1.96	125.25	-	24.75	-	24.75	
Sinhal, Darjeeling	-	219	-	-	3.27	9.26	10.10	9.25	6.91	8.66	6.18	6.18	5.87	-	50.23	-	9.13	4.37	13.70	
Harleing Depot	-	188	7.75	10.32	9.77	9.62	10.13	8.03	5.73	5.32	8.09	5.68	4.65	5.37	127.78	-	55.56	-	55.56	
8 Months, April to November	-	144	-	-	-	4.88	6.12	7.77	6.96	7.36	6.65	4.96	-	-	69.30	5.16	11.73	1.08	23.76	
Benares	-	988	6.76	7.14	4.82	6.07	5.48	6.77	7.31	7.52	9.75	8.17	4.90	5.77	169.91	5.55	17.37	1.85	27.75	
Dinapore	-	1,081	-	-	2.96	4.05	3.69	4.62	5.88	6.35	5.16	4.45	-	-	50.80	5.05	-	-	5.05	
Benares	-	140	-	-	4.42	4.50	4.16	4.09	5.15	5.27	4.85	4.04	3.18	4.13	115.87	1.04	8.29	1.04	10.37	
7 Months, March to September	-	198	-	-	5.63	5.62	3.43	3.07	4.35	3.67	7.98	6.73	6.15	4.43	98.50	15.79	27.98	1.81	44.53	
9 Months, April to December	-	333	3.81	4.40	4.11	3.58	3.20	4.45	5.98	6.62	8.05	7.03	3.61	4.25	117.76	-	12.25	1.53	13.78	
Lucknow	-	2,470	3.54	4.40	5.63	6.07	5.92	5.12	5.43	5.43	6.77	5.46	4.92	4.70	120.51	-	16.37	8.63	20.00	
Seetapore	-	633	4.36	6.14	8.29	6.87	6.30	5.29	5.12	5.43	6.77	5.46	4.92	4.70	123.58	5.80	19.46	1.88	25.64	
Benares	-	551	4.75	5.64	6.24	7.21	5.96	6.42	5.49	5.98	5.85	5.46	4.70	4.70	123.58	12.68	11.58	1.05	25.36	
Allahabad	-	1,131	4.65	4.44	4.87	9.71	8.83	8.43	6.70	6.11	6.16	10.71	12.01	12.09	130.45	-	11.11	1.85	12.50	
Nagode	-	198	5.40	5.58	8.65	10.15	7.54	7.39	8.14	7.74	6.16	5.72	4.32	3.18	120.45	-	11.11	1.85	12.50	
Shahjahanpore	-	589	4.44	5.13	5.06	5.18	5.17	4.44	4.73	5.27	5.91	6.23	5.91	6.23	102.69	1.13	13.53	-	14.76	
Barilly	-	831	3.80	4.03	4.64	4.07	4.90	5.66	5.68	5.91	6.23	5.91	6.23	5.91	159.85	-	46.59	5.82	53.19	
8 Months, April to November	-	279	-	-	-	13.00	18.28	18.71	18.96	19.36	14.01	13.75	10.22	-	152.66	-	47.87	5.82	53.19	
Nyneee Tal Depot	-	188	-	-	-	17.33	13.54	13.54	13.54	13.54	13.54	13.54	13.54	13.54	122.66	-	14.85	-	14.85	
Landour Depot	-	337	5.54	5.51	4.60	4.85	5.25	5.25	5.25	5.25	5.25	5.25	5.25	5.25	185.35	-	14.85	-	14.85	
Moradabad	-	546	4.74	5.75	5.75	5.75	5.75	5.75	5.75	5.75	5.75	5.75	5.75	5.75	185.35	-	14.85	-	14.85	
Roorkhee	-	1,880	6.31	7.34	7.60	6.92	10.43	9.58	8.51	7.95	5.83	5.82	4.07	4.29	193.40	-	12.77	1.04	18.30	
11 Months, February to December	-	964	6.10	8.54	11.08	7.16	9.60	9.79	8.32	7.78	7.92	5.10	4.99	4.55	10.96	3.82	8.94	5.3	23.82	
Almora	-	1,031	3.63	5.49	6.56	5.08	6.44	7.03	4.78	5.86	5.86	6.59	6.47	6.25	169.38	7.95	13.91	1.99	9.94	
8 Months, April to October	-	207	3.26	3.76	6.57	4.98	4.98	4.98	4.98	4.98	4.98	4.98	4.98	4.98	140.10	-	14.49	4.83	19.32	
Gwalior Citadel	-	148	6.40	5.49	4.94	4.94	4.94	4.94	4.94	4.94	4.94	4.94	4.94	4.94	155.68	-	18.95	-	18.95	
Seepree	-	686	4.74	4.74	4.74	4.74	4.74	4.74	4.74	4.74	4.74	4.74	4.74	4.74	114.09	-	18.95	-	18.95	
11 Months, February to December	-	213	7.05	7.34	7.34	7.34	7.34	7.34	7.34	7.34	7.34	7.34	7.34	7.34	239.66	2.45	18.86	1.22	22.03	
Almora	-	1,031	3.63	5.49	5.56	5.56	5.56	5.56	5.56	5.56	5.56	5.56	5.56	5.56	185.35	-	18.86	1.22	22.03	
8 Months, April to October	-	207	3.26	3.76	6.57	4.98	4.98	4.98	4.98	4.98	4.98	4.98	4.98	4.98	185.35	-	18.86	1.22	22.03	
Gwalior Citadel	-	148	6.40	5.49	4.94	4.94	4.94	4.94	4.94	4.94	4.94	4.94	4.94	4.94	185.35	-	18.86	1.22	22.03	
Seepree	-	686	4.74	4.74	4.74	4.74	4.74	4.74	4.74	4.74	4.74	4.74	4.74	4.74	185.35	-	18.86	1.22	22.03	
11 Months, February to December	-	213	7.05	7.34	7.34	7.34	7.34	7.34	7.34	7.34	7.34	7.34	7.34	7.34	185.35	-	18.86	1.22	22.03	
Almora	-	1,031	3.63	5.49	5.56	5.56	5.56	5.56	5.56	5.56	5.56	5.56	5.56	5.56	185.35	-	18.86	1.22	22.03	
8 Months, April to October	-	207	3.26	3.76	6.57	4.98	4.98	4.98	4.98	4.98	4.98	4.98	4.98	4.98	185.35	-	18.86	1.22	22.03	
Gwalior Citadel	-	148	6.40	5.49	4.94	4.94	4.94	4.94	4.94	4.94	4.94	4.94	4.94	4.94	185.35	-	18.86	1.22	22.03	
Seepree	-	686	4.74	4.74	4.74	4.74	4.74	4.74	4.74	4.74	4.74	4.74	4.74	4.74	185.35	-	18.86	1.22	22.03	
11 Months, February to December	-	213	7.05	7.34	7.34	7.34	7.34	7.34	7.34	7.34	7.34	7.34	7.34	7.34	185.35	-	18.86	1.22	22.03	
Almora	-	1,031	3.63	5.49	5.56	5.56	5.56	5.56	5.56	5.56	5.56	5.56	5.56	5.56	185.35	-	18.86	1.22	22.03	
8 Months, April to October	-	207	3.26	3.76	6.57	4.98	4.98	4.98	4.98	4.98	4.98	4.98	4.98	4.98	185.35	-	18.86	1.22	22.03	
Gwalior Citadel	-	148	6.40	5.49	4.94	4.94	4.94	4.94	4.94	4.94	4.94	4.94	4.94	4.94	185.35	-	18.86	1.22	22.03	
Seepree	-	686	4.74	4.74	4.74	4.74	4.74	4.74	4.74	4.74	4.74	4.74	4.74	4.74	185.35	-	18.86	1.22	22.03	
11 Months, February to December	-	213	7.05	7.34	7.34	7.34	7.34	7.34	7.34	7.34	7.34	7.34	7.34	7.34	185.35	-	18.86	1.22	22.03	
Almora	-	1,031	3.63	5.49	5.56	5.56	5.56	5.56	5.56	5.56	5.56	5.56	5.56	5.56	185.35	-	18.86	1.22	22.03	
8 Months, April to October	-	207	3.26	3.76	6.57	4.98	4.98	4.98	4.98	4.98	4.98	4.98	4.98	4.98	185.35	-	18.86	1.22	22.03	
Gwalior Citadel	-	148	6.40	5.49	4.94	4.94	4.94	4.94	4.94	4.94	4.94	4.94	4.94	4.94	185.35	-	18.86	1.22	22.03	
Seepree	-	686	4.74	4.74	4.74	4.74	4.74	4.74	4.74	4.74	4.74	4.74	4.74	4.74	185.35	-	18.86	1.22	22.03	
11 Months, February to December	-	213	7.05	7.34	7.34	7.34	7.34	7.34	7.34	7.34	7.34	7.34	7.34	7.34	185.35	-	18.86	1.22	22.03	
Almora	-	1,031	3.63	5.49	5.56	5.56	5.56	5.56	5.56	5.56	5.56	5.56	5.56	5.56	185.35	-	18.86	1.22	22.03	
8 Months, April to October	-	207	3.26	3.76	6.57	4.98	4.98	4.98	4.98	4.98	4.98	4.98	4.98	4.98	185.35	-	18.86	1.22	22.03	
Gwalior Citadel	-	148	6.40	5.49	4.94	4.94	4.94	4.94	4.94	4.94	4.94	4.94	4.94	4.94	185.35	-	18.86	1.22	22.03	
Seepree	-	686	4.74	4.74	4.74	4.74	4.74	4.74	4.74	4.74	4.74	4.74	4.74	4.74	185.35	-	18.86	1.22	22.03	
11 Months, February to December	-	213	7.05	7.34	7.34	7.34	7.34	7.34	7.34	7.34	7.34	7.34	7.34	7.34	185.35	-	18.86	1.22	22.03	
Almora	-	1,031	3.63	5.49	5.56	5.56	5.56	5.56	5.56	5.56	5.56	5.56	5.56	5.56	185.35	-	18.86	1.22	22.03	
8 Months, April to October	-	207	3.26	3.76	6.57	4.98	4.98	4.98	4.98	4.98	4.98	4.98	4.98	4.98	185.35	-	18.86	1.22	22.03	
Gwalior Citadel	-	148	6.40	5.49	4.94	4.94	4.94	4.94	4.94	4.94	4.94	4.94	4.94	4.94	185.35	-	18.86	1.22	22.03	
Seepree	-	686	4.74	4.74	4.74	4.74	4.74	4.74	4.74	4.74	4.74	4.74	4.74	4						

I.—EUROPEAN TROOPS, 1864—continued.

TABLE showing the Ratio in which the PRINCIPAL DISEASES have contributed to make up the ADMISSION-RATE of the Year in the CHIEF MILITARY STATIONS of the *Bengal Presidency*.

STATIONS.	Average Strength for the period of Observation.	ADMITTED INTO HOSPITAL PER CENT. OF AVERAGE STRENGTH.											Admitted per Cent. of Average Strength from all Causes.
		Cholera.	Heat Apoplexy.	Fevers.	Dysentery.	Diarrhoea.	Hepatitis.	Ophthalmia.	Rheumatism.	Veneral Diseases.	Diseases of the Respiratory Organs.	All other Causes.	
Fort William - -	790	·89	-	46·20	4·68	16·33	3·54	7·34	11·14	41·77	6·46	41·65	180·00
Dum-Dum - - -	592	·34	·17	38·85	1·86	8·11	3·21	2·70	6·75	14·19	5·41	25·84	107·43
Bariackpore - -	455	·66	·22	40·44	3·96	18·46	3·52	1·98	3·30	19·78	5·05	56·26	153·63
Berhampore (9 months)	202	-	·50	31·19	4·45	8·42	6·44	-	5·45	21·28	10·89	36·63	125·25
Sinchal, Darjeeling -	219	-	-	2·74	2·74	2·23	1·83	·92	4·56	11·42	2·28	21·46	50·23
Darjeeling Depôt (8 months).	144	-	·69	13·89	2·78	8·34	9·72	4·86	24·30	22·91	7·65	32·64	127·78
Hazareebaugh (6 months)	938	-	·21	8·95	3·52	8·53	·96	2·67	3·73	13·22	5·33	22·18	69·30
Dinapore - - -	968	·83	·31	54·96	3·92	10·64	3·20	3·92	17·46	36·37	4·34	33·47	169·32
Benares - - -	1,081	·65	·55	36·45	4·90	15·91	5·00	7·03	5·83	33·67	7·59	51·62	169·20
Fyzabad - - -	964	·10	-	19·92	2·59	4·05	4·77	3·11	9·13	25·31	8·71	38·18	115·87
Roy Bareilly (9 months)	333	-	-	21·92	·30	4·81	10·81	2·10	·90	15·92	7·51	34·28	98·50
Lucknow - - -	2,470	2·23	·48	41·82	6·52	20·20	4·70	4·62	6·96	20·85	8·91	53·28	170·57
Seetapore - - -	653	-	·15	14·66	3·06	8·42	8·42	2·60	5·82	23·28	8·42	42·73	117·76
Futtehghurh - -	551	-	·54	26·32	1·63	5·99	3·27	7·08	8·17	25·95	8·17	33·39	120·51
Cawnpore - - -	1,131	·53	·09	30·06	1·15	9·72	4·33	3·01	8·05	29·00	7·96	35·28	129·18
Allahabad - - -	950	1·37	·11	24·63	5·16	12·74	5·47	3·16	5·37	28·63	4·21	32·73	123·58
Nagode - - -	198	-	-	18·18	1·01	1·51	1·51	2·53	19·70	38·89	6·57	45·45	135·35
Shahjehanpore - -	539	-	·19	12·43	·93	3·15	7·42	3·52	3·53	26·90	4·82	39·70	102·39
Bareilly - - -	881	·11	·23	16·57	2·84	5·79	5·56	4·77	3·29	23·27	6·58	33·83	102·84
Nynsee Tal (8 months)	279	-	-	26·88	3·22	13·98	19·36	5·37	15·77	30·11	9·68	35·48	159·85
Landour (8 months)	188	-	-	14·36	2·13	2·66	10·11	12·76	20·21	18·62	17·02	54·79	152·66
Moradabad - - -	337	-	·30	10·68	·30	3·56	4·75	2·97	2·37	44·51	7·71	21·36	93·51
Roorkee - - -	546	-	-	39·38	6·59	9·34	3·11	2·75	8·06	17·76	7·33	41·03	135·35
Meerut - - -	1,880	-	·37	49·79	3·67	11·44	5·05	4·89	10·48	33·83	7·23	66·65	199·40
Delhi - - -	964	-	·21	90·46	4·67	7·68	7·78	7·68	6·12	37·96	7·05	68·15	237·76
Muttra (11 months)	503	-	-	64·41	1·39	4·18	6·16	1·79	6·16	35·39	5·96	43·94	169·38
Agra - - -	1,036	-	·09	70·66	2·32	11·20	3·28	3·38	12·55	16·41	9·17	39·38	163·44
Morar - - -	1,051	-	·29	61·08	2·76	6·95	5·90	3·52	14·18	19·03	10·18	46·14	170·03
Gwalior Citadel -	207	-	·97	20·77	2·90	8·70	3·35	3·87	6·76	28·02	6·28	58·45	140·10
Seepree (7 months)	148	-	-	19·59	2·70	1·35	7·43	4·73	6·08	17·57	2·03	9·47	70·95
Jhansi - - -	686	-	·29	34·69	3·21	6·12	4·81	5·40	8·89	34·69	6·12	51·46	155·68
Nowgong - - -	213	·47	-	23·47	·47	·94	1·41	5·17	16·90	15·02	4·70	45·54	114·09
Saugor - - -	817	·24	-	81·27	3·80	14·57	4·53	3·80	11·14	39·90	10·65	70·26	239·66
Jubbulpore - -	757	·13	·13	112·02	6·87	17·17	3·04	2·51	5·94	52·58	7·27	41·22	248·88
Umballa - - -	1,635	-	·06	43·36	3·00	8·93	3·00	4·16	7·34	18·29	5·93	41·16	135·22
Dugshaie (9 months)	799	-	·13	11·02	3·00	3·88	1·00	1·50	6·38	12·27	10·01	25·53	74·72
Kussowlie (11 months)	236	-	-	44·07	·42	28·81	7·20	4·24	6·36	26·27	29·66	51·70	198·73
Kussowlie Depôt (7 months).	402	-	-	30·60	4·48	9·45	9·45	6·22	13·43	17·66	9·20	38·56	139·05
Subathoo (8 months)	882	-	-	4·31	1·02	3·97	1·25	2·83	2·72	12·59	2·61	15·75	47·05
Phillour - - -	105	-	-	37·14	-	9·52	5·72	-	3·81	19·05	4·76	36·19	116·19
Jullundur - - -	893	-	·11	21·05	1·90	2·93	10·97	4·93	5·04	17·58	4·81	32·92	102·24
Ferozepore - - -	890	-	·22	51·91	1·24	7·08	5·50	1·46	8·99	18·54	8·88	38·31	142·13
Mooltan - - -	934	-	·22	148·39	5·14	4·18	3·64	2·03	5·14	11·13	11·14	43·79	234·80
Dera-Ismael-Khan -	98	-	-	195·92	6·12	18·37	12·24	2·04	7·14	14·29	18·37	33·67	308·16
Sealkote - - -	1,319	-	·15	27·67	1·59	5·61	7·81	5·01	8·19	15·77	6·82	51·48	130·10
Kangra - - -	123	-	-	13·82	·81	1·63	1·63	4·07	4·88	17·88	·81	17·88	63·41
Umrtsur - - -	501	-	·40	83·43	8·58	12·58	4·59	4·99	7·78	26·35	8·98	71·66	229·34
Fort Lahore - - -	132	-	-	84·09	5·30	18·94	6·82	4·55	15·15	9·09	40·91	189·40	227·59
Meean Meer - - -	910	·11	·11	53·52	4·83	9·34	5·16	3·30	9·45	24·40	9·78	51·32	171·32
Rawul Pindie - -	1,671	-	·30	92·16	3·29	8·38	8·56	5·98	12·27	22·08	11·25	50·21	214·45
Campbellpore (9 months)	423	-	-	69·50	·24	5·91	2·84	2·37	6·38	9·93	4·49	21·27	122·93
Attock - - -	145	-	-	124·83	3·45	7·59	8·96	4·14	3·45	15·86	4·83	54·48	227·59
Murree (6 months)	316	-	·32	25·63	6·33	·32	25·31	6·96	6·33	9·49	3·80	22·15	106·64
Road-making Detachments, Murree Hills (6 months).	605	-	-	37·36	1·16	2·81	2·97	4·96	4·13	7·77	4·13	15·87	81·16
Nowshera (10 months)	807	-	·87	46·33	1·24	2·36	10·66	5·21	3·72	17·10	7·68	26·76	121·93
Peshawur - - -	2,012	-	·15	167·99	2·73	7·45	3·88	3·58	5·02	28·38	6·91	33·50	259·59

I.—EUROPEAN TROOPS, 1864—continued.

TABLE showing the PREVALENCE of SMALL-POX in each Month, and the Distribution of the DISEASE by STATIONS and PROVINCES.

STATIONS.	Average Strength for the period of Occupation.	NUMBER OF ADMISSIONS INTO HOSPITAL IN EACH MONTH.												Total Admissions.	Admitted per Cent. of Average Strength.	Number of Deaths.	Died per 1,000 of Average Strength.
		January.	February.	March.	April.	May.	June.	July.	August.	Sept.	October.	Nov.	Dec.				
Hospital Ship "Bentinck" - - -	74	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Kidderpore Hospital - - -	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chinsurah Depôt - - -	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Allahabad General Hospital - - -	37	-	-	-	-	-	-	-	-	-	-	-	1	1	-	-	-
Invalids, Recruits, and time-expired men on the march.	-	-	-	-	-	-	-	-	-	-	-	-	1	1	-	-	-
Fort William - - -	790	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dum-Dum - - -	592	-	-	1	-	-	-	-	-	-	-	-	1	2	-	-	-
Barrackpore - - -	455	-	-	1	-	-	-	-	-	-	-	-	-	1	-	-	-
Berhampore - - -	202	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bhootan Field Force - - -	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	2,002	-	-	2	-	-	-	-	-	-	-	-	1	3	·15	-	-
Sinhal, Darjeeling - - -	219	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Darjeeling Depôt - - -	144	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hazareebaugh - - -	938	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dinapore - - -	968	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Benares - - -	1,081	-	-	-	-	1	1	1	-	-	-	-	-	3	-	2	-
Jounpore - - -	149	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Azimghur - - -	198	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Fyzabad - - -	964	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Roy Bareilly - - -	333	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Lucknow - - -	2,470	-	-	1	1	5	5	-	-	-	-	-	-	12	-	3	-
Seetapore - - -	653	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Futtehghur - - -	551	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cawnpore - - -	1,131	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Allahabad - - -	950	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Nagode - - -	198	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	10,333	-	-	1	1	6	6	1	-	-	-	-	-	15	·15	5	·49
Shahjehanpore - - -	539	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bareilly - - -	881	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Nyne Tal - - -	279	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Landour - - -	188	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Moradabad - - -	337	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Roorkee - - -	546	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Meerut - - -	1,880	-	-	-	-	-	-	-	-	1	-	1	5	7	-	-	-
Delhi - - -	964	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Muttra - - -	503	-	-	-	-	-	-	-	-	-	-	3	10	13	-	3	-
	5,950	-	-	-	-	-	-	-	-	1	-	4	15	20	·33	3	·51
Agra - - -	1,036	-	-	1	1	7	4	-	-	-	-	-	1	14	-	2	-
Morar - - -	1,051	2	1	1	1	2	-	-	-	-	-	1	-	8	-	-	-
Gwalior Citadel - - -	207	1	1	-	-	-	-	-	-	-	-	-	-	2	-	-	-
Seepree - - -	148	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Jhansi - - -	686	-	2	-	-	-	-	-	-	-	-	-	-	2	-	-	-
Nowgong - - -	213	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Saugor - - -	817	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Jubbulpore - - -	757	-	-	1	2	1	-	1	-	-	-	-	-	5	-	1	-
	4,854	3	4	3	4	10	4	1	-	-	-	1	1	31	·64	3	·62
Umballa - - -	1,635	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dugshaie - - -	799	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dugshaie Depôt - - -	53	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Kussowlie - - -	236	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Kussowlie Depôt - - -	402	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Subathoo - - -	882	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Phillour - - -	105	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Jullundur - - -	893	-	-	-	-	-	-	-	-	-	-	-	1	1	-	-	-
Ferozepore - - -	890	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Mooltan - - -	934	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dera-Ismael-Khan - - -	98	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sealkote - - -	1,319	-	-	-	-	-	-	-	-	-	-	1	1	2	-	-	-
Kangra - - -	123	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Umritsur - - -	501	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Fort Lahore - - -	132	-	-	-	-	-	-	-	-	-	-	-	1	1	-	-	-
Meeran Meer - - -	910	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-
Rawul Pindee - - -	1,671	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Campbellpore - - -	423	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Attock - - -	145	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Murree Convalescent Depôt - - -	316	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Road-making Detachment, Murree Hills. - - -	605	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Nowshera - - -	807	-	-	-	-	-	-	-	-	-	-	1	-	1	-	-	-
Peshawur - - -	2,012	-	-	-	-	-	-	-	-	-	-	2	2	4	-	-	-
Nundcote Depôt - - -	103	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Troops on the march (Punjaub) - - -	-	-	-	-	-	-	-	-	-	-	-	3	2	5	-	1	-
	15,886	-	-	-	-	-	-	-	-	-	-	7	7	14	·09	3	·19
Troops on the march, Bengal and North Western Provinces. - - -	-	-	-	-	-	-	-	-	-	-	-	2	-	2	-	-	-
BENGAL PRESIDENCY - - -	40,385	3	4	6	5	16	10	2	-	1	-	14	26	87	·22	14	·55

1.—EUROPEAN TROOPS, 1864—continued.

TABLE showing the PREVALENCE of CHOLERA in each Month, and the Distribution of the DISEASE by STATIONS and PROVINCES.

STATIONS.	Average Strength during the Period of Occupation.	NUMBER OF ADMISSIONS INTO HOSPITAL IN EACH MONTH.												Total Admissions.	Admitted per Cent. of Average Strength.	Number of Deaths.	Died per 1,000 of Average Strength.
		Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.				
Hospital Ship, "Bentinck" - -	74	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Kidderpore Hospital - - -	-	-	1	1	-	-	-	-	-	-	1	2	-	5	-	3	-
Chinsurah Depôt - - -	-	-	-	-	1	-	-	-	-	-	-	3	-	4	-	3	-
Allahabad General Hospital -	37	-	1	2	-	1	-	-	-	1	-	1	-	6	-	5	-
Invalids, Recruits, and Time expired Men on the march.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Fort William - - -	790	-	2	-	1	1	-	-	-	-	1	-	2	7	-	2	-
Dum-Dum - - -	592	-	1	-	1	-	-	-	-	-	-	-	-	2	-	1	-
Barrackpore - - -	455	-	-	1	2	-	-	-	-	-	-	-	-	3	-	2	-
Berhampore - - -	202	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bhootan Field Force - - -	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	2,002	-	3	1	4	1	-	-	-	-	1	-	2	12	60	5	2·50
Sinchal, Darjeeling - - -	219	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Darjeeling Depôt - - -	144	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hazareebaugh - - -	938	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dinapore - - -	968	-	-	-	1	-	-	5	1	-	1	-	-	8	-	5	-
Benares - - -	1,081	-	-	-	-	1	1	4	1	-	-	-	-	7	-	6	-
Jounpore - - -	149	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Azimgurh - - -	198	-	-	-	-	1	-	-	-	-	-	-	-	1	-	1	-
Fyzabad - - -	964	-	-	-	1	-	-	-	-	-	-	-	-	1	-	1	-
Roy Bareilly - - -	333	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Lucknow - - -	2,470	-	-	-	-	-	-	-	-	54	1	-	-	55	-	39	-
Seetapore - - -	653	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Futtehghurh - - -	551	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6	-
Cawnpore - - -	1,131	-	-	-	-	-	1	-	4	1	-	-	-	6	-	6	-
Allahabad - - -	950	-	-	2	-	-	-	-	-	11	-	-	-	13	-	12	-
Nagode - - -	198	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	10,333	-	-	2	2	2	2	9	6	66	2	-	-	91	·88	70	6·77
Shahjehanpore - - -	539	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bareilly - - -	881	-	-	-	-	-	1	-	-	-	-	-	-	1	-	1	-
Nynce Tal - - -	279	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Landour - - -	188	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Mooradabad - - -	337	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Roorkee - - -	546	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Meerut - - -	1,880	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Delhi - - -	964	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Muttra - - -	503	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	5,950	-	-	-	-	-	1	-	-	-	-	-	-	1	·02	1	·16
Agra - - -	1,036	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Morar - - -	1,051	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Gwalior Citadel - - -	207	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Seepree - - -	148	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Jhansi - - -	686	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Nowgong - - -	213	-	-	-	-	-	-	-	-	1	-	-	-	1	-	1	-
Saugor - - -	817	-	-	-	-	-	-	1	-	-	1	-	-	2	-	2	-
Jubbulpore - - -	757	-	-	-	-	-	1	-	-	-	-	-	-	1	-	-	-
	4,854	-	-	-	-	-	1	1	-	1	1	-	-	4	·08	3	·62
Umballa - - -	1,635	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dugshaie - - -	799	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dugshaie Depôt - - -	53	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Kussowlie - - -	236	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Kussowlie Depôt - - -	402	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Subathoo - - -	882	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Phillour - - -	105	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Jullundur - - -	893	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ferozepore - - -	890	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Mooltan - - -	934	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Deia Ismael Khan - - -	98	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sealkote - - -	1,319	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Kangra - - -	123	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Umritsur - - -	501	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Fort Lahore - - -	132	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Meean Meer - - -	910	-	-	-	-	1	-	-	-	-	-	-	-	1	-	1	-
Rawul Pindee - - -	1,671	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Campbellpore - - -	423	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Attock - - -	145	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Murree Convalescent Depôt -	316	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Road-making Detachments, Murree Hills.	605	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Nowshera - - -	807	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Peshawur - - -	2,012	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Nundcote Depôt - - -	103	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Troops on the march (Punjab) -	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	15,886	-	-	-	-	1	-	-	-	-	-	-	-	1	-	1	·06
Troops on the march, Bengal, and N. W. P.	-	-	-	9	15	-	-	-	-	-	-	-	-	24	-	12	-
BENGAL PRESIDENCY - - -	40,385	-	5	15	22	5	4	10	6	68	5	6	2	148	·33	103	2·55

1.—EUROPEAN TROOPS, 1864—*continued.*

TABLE showing the CAUSES of DEATH and INVALIDING.

TOTAL LOSS TO THE SERVICE BY DEATH AND INVALIDING, 2,330. PER 1,000 OF AVERAGE STRENGTH, 57·85.

NUMBER OF MEN LOST TO THE SERVICE BY DEATH, 852.				NUMBER OF MEN LOST TO THE SERVICE BY INVALIDING, 1484.			
CAUSES OF DEATH.	Died in Hospital.	Died out of Hospital.	Died per 1,000 of Strength.	CAUSES OF INVALIDING.	Invalided for Discharge from the Service.	Invalided for Change of Climate.	Invalided per 1,000 of Strength.
Variola - - - - -	14	-	·35	Febris - - - - -	12	54	1·63
Febris intermittens - - - - -	41	-	1·01	Ophthalmia - - - - -	43	40	2·05
Febris remittens - - - - -	52	-	1·29	Dysenteria - - - - -	4	43	1·63
Febris continua - - - - -	34	-	·84	Diarrhœa - - - - -	-	19	
Anthrax - - - - -	1	-	-	Rheumatismus - - - - -	1	83	3·81
Erysipelas - - - - -	1	-	-	Syphilis - - - - -	28	61	2·38
Dysenteria acute - - - - -	55	-	1·36	Iritis syphilitica - - - - -	-	2	
Dysenteria chronica - - - - -	11	-	·27	Stricture urethræ - - - - -	1	4	3·32
Diarrhœa - - - - -	27	-	·67	Purpura - - - - -	-	4	
Cholera - - - - -	103	-	2·55	Tænia - - - - -	-	1	-
Rheumatismus - - - - -	3	-	-	Anœmia - - - - -	1	26	-
Syphilis secundaria - - - - -	10	-	-	Anasarca - - - - -	-	1	-
Hydrophobia - - - - -	3	-	-	Scrofula - - - - -	8	9	-
Purpura - - - - -	2	-	-	Phthisis pulmonalis - - - - -	63	69	3·32
Ebriositas - - - - -	3	-	-	Hæmoptysis - - - - -	2	-	
Anœmia - - - - -	2	-	-	Meningitis - - - - -	-	1	-
Anasarca - - - - -	1	-	-	Apoplexia - - - - -	1	1	-
Scirrhomia - - - - -	2	-	-	Paralysis - - - - -	12	7	-
Scrofula - - - - -	1	-	-	Mania - - - - -	4	3	·64
Phthisis pulmonalis - - - - -	64	-	1·61	Dementia - - - - -	11	7	
Hæmoptysis - - - - -	1	-		Melancholia - - - - -	-	1	-
Abscessus psoanus - - - - -	2	-	-	Epilepsia - - - - -	26	5	·77
Meningitis - - - - -	4	-	-	Cephalea - - - - -	1	5	-
Encephalitis - - - - -	2	-	-	Neuralgia - - - - -	-	7	-
Apoplexia - - - - -	62	5	1·65	Otitis - - - - -	-	1	-
Paralysis - - - - -	10	-	-	Dysœcœa - - - - -	10	2	-
Paraplegia - - - - -	2	-	-	Stammering - - - - -	1	-	-
Delirium tremens - - - - -	16	-	·40	Amorosus - - - - -	3	3	-
Epilepsia - - - - -	6	-	-	Pericarditis - - - - -	2	-	3·00
Tetanus - - - - -	1	-	-	Morbus cordis - - - - -	47	55	
Dementia - - - - -	1	-	-	Aneurisma - - - - -	2	-	1·19
Pericarditis - - - - -	2	-	-	Varix - - - - -	6	3	
Morbus cordis - - - - -	25	1	·99	Palpitatio - - - - -	-	6	1·19
Aneurisma - - - - -	10	4		Epistaxis - - - - -	-	1	
Laryngitis - - - - -	1	-	1·01	Bronchitis - - - - -	11	31	5·05
Bronchitis - - - - -	19	-		Asthma - - - - -	2	2	
Pleuritis - - - - -	4	-	-	Dyspœa - - - - -	-	1	-
Pneumonia - - - - -	17	-	-	Angina pectoris - - - - -	-	1	-
Asthma - - - - -	1	-	-	Enteritis - - - - -	-	1	-
Gastritis - - - - -	2	-	-	Peritonitis - - - - -	-	1	-
Enteritis - - - - -	5	-	-	Hernia - - - - -	12	1	-
Peritonitis - - - - -	10	-	-	Dyspepsia - - - - -	1	13	-
Hernia - - - - -	1	-	-	Hæmorrhoids - - - - -	-	1	-
Dyspepsia - - - - -	2	-	-	Fistula in ano - - - - -	1	3	-
Hæmatemesia - - - - -	2	-	-	Splenitis - - - - -	1	15	-
Splenitis - - - - -	2	-	-	Hepatitis - - - - -	31	173	5·05
Hepatitis acuta - - - - -	49	-	-	Ascites - - - - -	1	-	-
Hepatitis chronica - - - - -	70	-	1·21	Nephritis - - - - -	2	2	-
Cirrhosis - - - - -	1	-	1·74	Lithiasis - - - - -	-	1	-
Icterus - - - - -	3	-	-	Eneuresis - - - - -	1	1	-
Ascites - - - - -	1	-	-	Diabetes - - - - -	1	1	-
Albumenuria - - - - -	1	-	-	Fistula in perineo - - - - -	-	2	-
Nephritis - - - - -	2	-	-	Orchitis - - - - -	-	12	-
Ischuria - - - - -	1	-	-	Synovitis - - - - -	3	-	-
Stricture urethræ - - - - -	1	-	-	Ostitis - - - - -	1	2	-
Abscessus - - - - -	1	-	-	Contractura - - - - -	7	2	-
Atrophy - - - - -	12	-	-	Necrosis - - - - -	4	-	-
Accident - - - - -	13	9	-	Caries - - - - -	1	2	-
Killed in action - - - - -	-	3	-	Ulcus - - - - -	8	13	-
Explosion - - - - -	-	5	-	Debility (worn out) - - - - -	95	88	5·20*
Accidental poisoning - - - - -	1	-	-	Dislocation - - - - -	1	1	1·12
Suffocation from intoxication - - - - -	-	1	1·46	Subluxation - - - - -	2	-	
Asphyxiated - - - - -	-	1	-	Fracture - - - - -	11	2	4·96
Drowning - - - - -	-	13	-	Contusion - - - - -	4	2	
Suicide - - - - -	1	11	-	Gunshot wound - - - - -	5	6	-
Homicide - - - - -	-	1	-	Incised wound - - - - -	3	-	-
Cause unknown - - - - -	1	-	-	Amputation - - - - -	8	-	-
				Cause not specified - - - - -	1	3	-
Ratio per 1,000 for Deaths from causes not specially calculated.	-	-	2·69	Ratio per 1,000 for Invaliding from causes not specially calculated.	-	-	4·96
	798	54	21·10		577	907	36·75

* Including Anœmia.

2.—NATIVE TROOPS, 1864.

TABLE showing the SICKNESS and MORTALITY among the NATIVE TROOPS serving in the *Bengal Presidency* during the Year 1864, and the prevalence of the principal Diseases in each Month of the Year.

(Police, Civil, and Local Corps are not included in these Tables.)

MONTHS.	Average Strength.	Average Number Daily Sick.	Daily Sick per Cent. of Average Strength.	Number of Deaths.	Died per 1,000 of Average Strength.	CAUSES OF DEATHS IN HOSPITAL.																	Died out of Hospital.																																																						
						Cholera.	Small-pox.	Fever, Intermittent.	Fever, Remittent.	Fever, Continued.	Apoplexy.	Delirium Tremens.	Dysentery.	Diarrhoea.	Hepatitis.	Spleen Diseases.	Respiratory Diseases.	Heart Diseases.	Phthisis Pulmonalis.	Dropsy.	Scurvy.	Atrophy and Anæmia.		Wounds and Accidents.	All other Causes.																																																				
January	37,917	1,639	4.32	38	-	-	11	3	2	-	-	3	3	1	1	7	1	-	1	-	-	2	3	3																																																					
February	37,874	1,560	4.12	50	-	1	6	4	3	-	-	5	5	-	1	11	1	-	-	-	2	6	4	1																																																					
March	37,461	1,445	3.86	57	-	7	8	3	1	-	-	6	2	1	1	18	1	3	-	-	2	2	2	1																																																					
April	37,349	1,430	3.83	41	-	6	4	9	1	-	-	1	2	-	-	8	-	2	1	-	2	2	2	2																																																					
May	36,095	1,435	3.98	46	-	12	2	7	-	-	-	3	4	1	-	7	1	-	-	1	-	3	5	5																																																					
June	36,568	1,382	3.78	36	-	10	3	5	3	1	-	1	1	-	1	1	2	2	-	-	-	1	1	3																																																					
July	37,347	1,318	3.53	26	-	3	1	4	1	1	1	2	1	-	1	2	1	-	2	-	1	2	3	3																																																					
August	36,653	1,446	3.95	34	-	2	-	5	4	1	1	-	6	2	-	3	-	2	-	-	2	5	1	-																																																					
September	36,509	1,830	5.01	22	-	1	-	5	7	-	-	2	2	1	1	1	-	1	-	-	-	2	-	-																																																					
October	37,325	1,943	5.21	22	-	5	-	8	4	-	1	-	1	5	-	1	3	-	2	1	-	-	1	-																																																					
November	37,947	2,052	5.41	51	-	10	2	12	2	-	-	7	7	-	1	4	1	2	-	-	-	1	1	1																																																					
December	37,661	1,740	4.62	56	-	5	4	14	4	1	-	3	8	-	-	3	1	3	-	-	-	-	8	2																																																					
						62	11	84	51	8	5	-	43	42	4	5	68	9	20	5	1	7	11	39	14																																																				
Died per 1,000 of the Average Strength.																																																																													
For the Year	37,225	1,600	4.30	489*	13.13	1.67	.30	2.26	1.37	.21	.13	-	1.16	1.13	.10	.13	1.83	.24	.54	.13	.03	.18	.29	1.05	.38																																																				
CAUSES OR ADMISSIONS.	NUMBER OF ADMISSIONS INTO HOSPITAL IN EACH MONTH.												Total Admissions during the Year.	Admitted per Cent. of Average Strength.	Died per Cent. of Admissions																																																														
	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.																																																																	
Cholera	-	-	12	26	39	16	6	6	4	9	16	7	141	.38	43.97																																																														
Small-pox	2	4	3	3	12	6	1	2	1	-	2	10	46	.12	23.31																																																														
Fever, intermittent	1,290	1,144	1,176	1,390	1,749	1,560	1,429	2,245	3,076	3,701	4,180	2,132	25,078	67.37	.55																																																														
" remittent	29	29	40	71	93	47	66	95	41	81	65	25	682	1.83																																																															
" continued	6	1	4	10	9	11	4	8	1	4	4	3	65	.18																																																															
Apoplexy	-	-	2	1	2	2	-	1	2	-	1	-	11	.03	45.46																																																														
Delirium tremens	1	-	-	-	-	-	-	-	-	1	-	-	2	.01	-																																																														
Dysentery	221	200	188	203	256	176	149	222	254	229	338	301	2,740	7.36	1.53																																																														
Diarrhoea	163	129	153	224	228	223	168	224	161	200	262	232	2,367	6.36	1.77																																																														
Hepatitis	7	7	8	5	5	1	4	6	4	5	4	5	61	.16	8.20																																																														
Spleen disease	18	28	30	16	21	17	23	20	14	15	32	17	251	.67	1.99																																																														
Respiratory diseases	170	180	162	102	107	61	68	96	65	77	131	145	1,364	3.66	4.99																																																														
Phthisis pulmonalis	4	2	5	1	3	1	3	4	3	2	3	2	33	.09	60.61																																																														
Scurvy	4	2	3	2	1	4	4	3	2	-	4	3	32	.09	3.12																																																														
Rheumatism	273	254	222	134	158	126	137	138	114	125	209	219	2,109	5.67	.44																																																														
Veneral diseases	141	145	153	141	162	153	176	153	120	156	206	134	1,840	4.94																																																															
Eye diseases	29	40	67	82	112	95	85	118	113	93	90	51	975	2.62																																																															
Abscess and ulcer	438	389	443	409	471	364	498	677	526	480	485	383	5,563	14.94																																																															
Wounds and accidents	436	300	380	359	363	343	347	421	338	352	460	361	4,460	11.98																																																															
All other causes	282	325	429	344	426	301	295	405	284	238	308	236	3,873	10.41																																																															
3,523															3,179	3,480	3,523	4,217	3,507	3,463	4,844	5,123	5,768	6,800	4,266	51,693																																																			
Admitted per Cent. of the Average Strength in each Month.																																																																													
9.29						8.39						9.29						9.43						11.68						9.59						9.27						13.21						14.03						15.45						17.92						11.33						138.87					

* The data upon which to base a normal Death-rate for the Native Army in any year, are not afforded in a register of mortality such as is furnished in the Returns from which the present Series of Tables is compiled. From the Annual Nominal Roll of Deaths for 1864 we find, that 604 men died in hospital, on outpost duty, and while at home on furlough; and even this roll is, perhaps, in respect to certain regiments incomplete. With the addition of the deaths which are not accounted for in these Tables, the Death-rate of the year, including in the Strength of the Army men on leave at their homes, may be estimated at 15 per 1,000.

2.—NATIVE TROOPS, 1864—continued.

TABLE showing the SICKNESS and MORTALITY among the NATIVE TROOPS serving in *Bengal Proper* and in *Assam* during the year 1864, and the prevalence of the principal Diseases in each month of the year.

MONTHS.	Average Strength.	Average Number Daily Sick.	Daily Sick per Cent. of Average Strength.	Number of Deaths.	Died per 1,000 of Average Strength.	CAUSES OF DEATHS IN HOSPITAL.																			Died out of Hospital.	
						Cholera.	Small-pox.	Fever, Intermittent.	Fever, Remittent.	Fever, Continued.	Apoplexy.	Delirium Tremens.	Dysentery.	Diarrhea.	Hepatitis.	Spleen Disease.	Respiratory Diseases.	Heart Diseases.	Phthisis Pulmonalis.	Dropsy.	Scurvy.	Atrophy and Anemia.	Wounds and Accidents.	All other Causes.		
January -	7,411	315	4.25	10	-	-	-	4	-	1	-	-	-	-	-	1	2	-	-	1	-	-	-	1		
February -	7,120	304	4.27	9	-	-	-	2	-	-	-	-	2	1	-	-	2	-	-	-	-	-	-	2		
March -	7,359	292	3.97	19	-	7	1	3	-	-	-	-	2	2	-	-	2	-	1	-	-	1	1	1		
April -	7,863	325	4.13	14	-	6	-	-	-	-	-	-	-	-	-	-	1	-	1	-	-	1	1	1		
May -	8,086	385	4.76	15	-	10	-	-	1	-	-	-	1	1	-	-	1	-	1	1	-	-	-	-		
June -	8,122	358	4.41	16	-	7	-	-	1	-	-	-	-	2	-	-	-	-	-	-	1	-	-	-		
July -	8,002	377	4.71	10	-	3	-	3	1	-	1	-	1	1	-	-	-	-	1	-	-	1	1	-		
August -	7,568	406	5.36	12	-	1	-	2	-	-	-	-	2	2	-	-	-	-	-	-	-	2	-	3		
September -	7,713	385	4.99	7	-	-	-	1	2	-	-	-	2	1	-	-	-	-	1	-	-	-	-	-		
October -	7,497	362	4.83	14	-	3	-	3	2	-	1	-	-	5	-	-	-	-	-	-	-	-	-	-		
November -	8,497	434	5.11	19	-	10	-	2	-	-	-	-	1	2	-	-	2	1	1	-	-	-	-	-		
December -	9,916	538	5.43	20	-	4	-	5	1	-	-	-	2	5	-	-	-	-	-	-	-	-	1	2		
						51	1	27	7	1	3	-	14	21	-	1	10	1	4	3	1	4	2	10	4	
Died per 1,000 of Average Strength.																										
For the Year	7,929	373	4.70	165	20.81	6.43	.13	3.41	.88	.13	.38	-	1.76	2.65	-	.13	1.26	.13	.50	.38	.13	.50	.25	1.26	.50	

CAUSES OF ADMISSIONS.	NUMBER OF ADMISSIONS INTO HOSPITAL IN EACH MONTH.												Total Admissions during the Year.	Admitted per Cent. of Average Strength.	Died per Cent. of Admissions.
	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.			
Cholera -	-	-	12	17	31	12	5	2	2	6	15	6	108	1.36	47.22
Small-pox -	1	2	-	-	3	-	1	-	-	-	-	-	7	.09	14.29
Fever, intermittent -	301	238	288	342	512	417	444	610	453	535	771	681	5,592	70.53	59
" remittent -	10	12	9	13	21	25	49	73	21	44	15	7	299	3.77	
" continued -	2	-	-	-	1	2	-	-	-	2	-	-	7	.09	
Apoplexy -	-	-	-	-	1	1	-	-	1	-	-	-	3	.04	100.00
Delirium tremens -	-	-	-	-	-	-	-	-	-	1	-	-	1	.01	1.45
Dysentery -	59	73	56	72	103	58	44	49	57	72	129	191	963	12.15	2.02
Diarrhoea -	78	56	72	113	132	108	60	76	54	93	104	94	1,040	13.12	-
Hepatitis -	2	2	4	2	1	-	-	-	1	-	-	1	13	.16	1.47
Spleen disease -	3	4	9	3	9	3	13	8	6	-	4	7	68	.86	3.46
Respiratory diseases -	34	40	38	23	29	9	15	19	14	10	28	30	289	3.64	57.11
Phthisis pulmonalis -	-	1	3	-	1	-	-	1	-	-	1	-	7	.09	20.00
Scurvy -	-	1	1	-	-	1	1	-	-	-	1	-	5	.06	-
Rheumatism -	39	53	48	31	53	37	31	33	21	18	51	48	463	5.84	67
Veneral diseases -	29	12	21	31	33	25	29	24	27	24	34	25	314	3.96	
Eye diseases -	5	6	15	9	8	12	14	12	12	14	9	6	122	11.54	
Abscess and ulcer -	60	73	90	66	100	55	84	110	68	56	54	65	881	11.11	
Wounds and accidents -	64	53	90	69	69	73	49	62	47	60	70	92	798	10.06	
All other causes -	64	68	102	76	137	85	70	134	77	59	86	61	1,019	2.85	
	751	694	858	867	1,244	923	908	1,213	861	994	1,372	1,314	11,999		
Admitted per Cent. of Average Strength in each Month.															
	10.13	9.75	11.66	11.02	15.38	11.36	11.35	16.03	11.16	13.26	16.15	13.25	151.33		

2.—NATIVE TROOPS, 1864—continued.

TABLE showing the SICKNESS and MORTALITY among the NATIVE TROOPS serving in the *Dinapore, Benares, Oude, and Cawnpore* Districts, during the Year 1864, and the prevalence of the principal Diseases in each Month of the Year.

MONTHS.	Average Strength.	Average Number Daily Sick.	Daily Sick per Cent of Average Strength.	Number of Deaths.	Died per 1,000 of Average Strength.	CAUSES OF DEATHS IN HOSPITAL.																Died out of Hospital.			
						Cholera.	Small-pox.	Fever, Intermittent.	Fever, Remittent.	Fever, Continued.	Apoplexy.	Delirium Tremens.	Dysentery.	Diarrhea.	Hepatitis.	Spleen Disease.	Respiratory Diseases.	Heart Diseases.	Phthisis Pulmonalis.	Dropsy.	Scurvy.		Atrophy and Anemia.	Wounds and Accidents.	All other Causes.
January	7,332	243	3.31	2	-	1	-	-	-	-	-	-	1	-	-	-	2	1	-	-	-	-	1	-	-
February	7,502	230	3.07	8	-	1	-	-	-	-	-	-	1	-	-	-	1	1	-	-	-	-	-	-	-
March	7,526	224	2.98	5	-	-	-	1	-	-	-	-	-	-	-	-	1	1	-	-	-	-	1	-	-
April	6,207	199	3.21	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
May	6,453	205	3.18	9	-	2	-	-	-	-	-	-	1	-	-	-	2	1	-	-	-	-	-	-	-
June	7,477	249	3.33	10	-	3	3	1	1	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-
July	7,703	220	2.86	9	-	-	1	1	1	-	-	-	1	-	-	-	-	1	-	-	-	-	-	2	-
August	7,617	228	2.99	6	-	1	-	1	1	-	-	-	1	-	-	-	1	-	-	-	-	-	-	1	-
September	7,529	281	3.73	5	-	1	-	-	2	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-
October	6,354	248	3.90	5	-	-	-	-	1	-	-	-	-	-	-	1	3	-	-	1	-	-	-	-	-
November	5,665	211	3.72	1	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-
December	5,971	192	3.22	3	-	-	1	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	1	-
						8	5	4	7	-	-	-	5	3	2	2	11	3	2	2	-	-	4	4	2
Died per 1,000 of the Average Strength.																									
For the Year	6,945	227	3.27	64	9.22	1.15	.72	.58	1.01	-	-	-	.72	.43	.29	.29	1.58	.43	.29	.29	-	-	.58	.58	.28

CAUSES OF ADMISSIONS.	NUMBER OF ADMISSIONS INTO HOSPITAL IN EACH MONTH.												Total Admissions during the Year.	Admitted per Cent. of Average Strength.	Died per Cent. of Admissions.
	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.			
Cholera	-	-	-	3	4	4	1	4	1	-	-	-	17	.24	47.06
Small-pox	-	-	1	-	8	6	-	2	1	-	-	2	20	.29	25.00
Fever, intermittent	143	113	128	123	203	201	236	389	373	373	331	201	2,814	40.52	.38
" remittent	-	2	2	4	2	9	1	6	9	6	6	4	51	.73	
" continued	-	-	1	3	2	1	3	5	-	1	-	-	16	.23	
Apoplexy	-	-	-	-	-	-	-	-	1	-	-	-	1	.01	.00
Delirium tremens	1	-	-	-	-	-	-	-	-	-	-	-	1	.01	.00
Dysentery	20	13	24	24	43	41	13	34	45	33	23	32	345	4.97	1.45
Diarrhoea	6	8	22	20	18	26	21	21	19	11	22	11	205	2.95	1.46
Hepatitis	-	-	-	1	1	-	2	3	2	3	-	1	13	.19	15.38
Spleen disease	5	7	4	5	5	4	5	4	2	4	2	2	49	.71	4.08
Respiratory diseases	18	19	14	10	16	9	15	18	12	13	17	31	192	2.77	5.73
Phthisis pulmonalis	-	1	-	-	-	1	1	-	1	1	1	-	6	.09	33.33
Dropsy	-	-	-	-	-	-	1	1	-	-	1	-	3	.04	.00
Scurvy	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Atrophy and Anemia	24	22	28	24	31	26	23	30	28	26	34	24	320	4.61	.49
Wounds and accidents	17	30	25	18	16	27	30	29	15	25	39	32	303	4.36	
All other causes	2	6	7	12	16	8	9	29	21	17	12	12	151	2.18	
Scabs and ulcer	89	66	72	66	71	66	97	110	99	65	74	73	948	13.65	.49
Wounds and accidents	38	35	41	54	52	51	55	53	53	40	36	36	544	7.83	
All other causes	61	59	131	66	80	64	48	60	55	64	49	34	771	11.10	
	424	381	500	433	568	544	561	798	737	682	647	495	6,770		
Admitted per Cent. of the Average Strength in each Month.															
	5.78	5.08	6.64	6.98	8.80	7.23	7.28	10.48	9.79	10.73	11.42	8.29	97.48		

2.—NATIVE TROOPS, 1864—continued.

TABLE showing the SICKNESS and MORTALITY among the NATIVE TROOPS serving in the Meerut and Rohilkund District during the Year 1864, and the prevalence of the principal Diseases in each Month of the Year.

MONTHS.	Average Strength.	Average Number Daily Sick.	Number Daily Sick per Cent. of Strength.	Number of Deaths.	Died per 1,000 of Strength.	CAUSES OF DEATHS IN HOSPITAL.																	Died out of Hospital.				
						Cholera.	Small-pox.	Fever, Intermittent.	Fever, Remittent.	Fever, Continued.	Apoplexy.	Delirium Tremens.	Dysentery.	Diarrhea.	Hepatitis.	Spleen Disease.	Respiratory Diseases.	Heart Diseases.	Phthisis Pulmonalis.	Dropsy.	Scurvy.	Atrophy and Anæmia.		Wounds and Accidents.	All other Causes.		
January	2,175	91	4.18	2	-	-	-	-	2	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-
February	2,386	89	3.73	7	-	-	-	-	2	-	-	-	-	-	-	-	-	1	1	-	-	-	-	-	1	-	-
March	2,889	140	4.85	3	-	-	-	-	1	-	-	-	-	-	-	-	-	1	1	1	-	-	-	-	-	-	-
April	4,926	218	4.43	3	-	-	-	-	1	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-
May	4,972	224	4.51	9	-	-	-	1	1	-	-	-	-	-	-	-	-	1	1	-	-	-	-	-	3	-	-
June	5,255	199	3.79	2	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
July	5,299	177	3.34	2	-	-	-	1	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-
August	5,299	213	4.02	4	-	-	-	-	1	1	1	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-
September	5,157	223	4.32	2	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	1	-	-	-
October	4,434	199	4.49	2	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
November	5,006	216	4.31	6	-	-	-	1	1	-	-	-	1	-	-	-	1	-	1	-	-	-	1	-	-	-	-
December	4,865	163	3.35	7	-	-	1	-	1	-	-	-	-	1	-	-	-	-	-	-	-	-	-	4	-	-	-
						-	1	5	11	1	1	-	1	1	-	1	9	2	3	-	-	-	1	9	3	-	-
Died per 1,000 of the Average Strength.																											
For the Year	4388	179	4.08	49	11.17	-	.23	1.14	2.51	.23	.23	-	.23	.23	-	.23	2.05	.45	.68	-	-	-	.23	2.05	.68	-	-

CAUSES OF ADMISSIONS.	NUMBER OF ADMISSIONS INTO HOSPITAL IN EACH MONTH.												Total Admissions during the Year.	Admitted per Cent. of Average Strength.	Died per Cent. of Admission
	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.			
Cholera - - - -	-	-	-	3	2	-	-	-	1	-	-	-	6	.14	-
Small-pox - - - -	-	-	-	-	1	-	-	-	-	-	-	1	2	.05	50.00
Fever, intermittent	39	43	76	209	278	169	125	213	188	196	217	81	1,834	41.80	.90
" remittent - - - -	6	3	5	6	4	5	5	5	1	4	3	5	52	1.19	
" continued - - - -	-	-	-	1	3	-	-	3	-	-	-	1	8	.18	
Apoplexy - - - -	-	-	-	-	-	-	-	1	-	-	-	-	1	.02	100.00
Delirium tremens - - - -	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dysentery - - - -	7	3	4	17	31	20	13	15	30	20	27	15	202	4.60	.50
Diarrhoea - - - -	-	3	6	20	6	20	11	16	8	2	10	13	115	2.62	.87
Hepatitis - - - -	-	-	-	1	-	-	1	-	-	1	1	1	5	.11	.00
Spleen disease - - - -	2	-	5	1	1	6	2	3	-	3	1	2	26	.69	3.85
Respiratory disease - - - -	10	14	28	19	19	10	11	16	12	10	15	9	173	3.94	5.20
Phthisis pulmonalis - - - -	1	-	1	1	-	-	1	1	-	-	-	-	5	.11	60.00
Scurvy - - - -	1	-	-	1	-	1	-	-	-	-	-	-	3	.07	.00
Rheumatism - - - -	26	17	24	25	19	20	26	18	17	13	33	36	274	6.24	.51
Veneral diseases - - - -	12	9	7	21	27	25	37	26	15	24	42	16	261	5.95	
Eye diseases - - - -	1	3	3	15	37	28	20	21	16	11	19	6	180	4.10	
Abscess and ulcer - - - -	51	55	94	106	132	101	111	171	118	106	145	60	1,250	28.49	
Wounds and accidents - - - -	24	25	25	54	53	56	48	77	35	31	74	47	549	12.51	
All other causes - - - -	24	25	38	22	41	37	40	55	46	28	30	23	439	10.01	
	204	200	316	552	654	498	451	641	487	449	617	316	5,385		
Admitted per Cent. of Average Strength in each Month.															
	9.38	8.38	10.94	11.21	13.15	9.48	8.51	12.10	9.44	10.13	12.33	6.50	122.72		

2.—NATIVE TROOPS, 1864—continued.

TABLE showing the SICKNESS and MORTALITY among the NATIVE TROOPS serving in the *Agra District* and in *Central India* during the Year 1864, and the prevalence of the principal Diseases in each Month of the Year.

						CAUSES OF DEATHS IN HOSPITAL.																					
MONTHS.	Average Strength.	Average Number Daily Sick.	Daily Sick per Cent. of Average Strength.	Number of Deaths.	Died per 1,000 of Average Strength.	Cholera.	Small-pox.	Fever, Intermittent.	Fever, Remittent.	Fever, Continued.	Apoplexy.	Delirium Tremens.	Dysentery.	Diarrhea.	Hepatitis.	Spleen Disease.	Respiratory Diseases.	Heart Diseases.	Phthisis Pulmonalis.	Dropsy.	Scurvy.	Atrophy and Anemia.	Wounds and Accidents.	All other Causes.	Died out of Hospital.		
January	5,295	210	3.97	5	-	-	-	-	-	-	-	-	-	1	1	-	2	-	-	-	-	-	-	1	-		
February	5,634	208	3.69	1	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-		
March	5,098	192	3.77	5	-	-	-	1	-	1	-	-	-	-	-	-	1	1	-	-	-	-	-	1	-		
April	5,086	183	3.60	1	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-		
May	4,973	190	3.82	2	-	-	-	-	1	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-		
June	5,031	166	3.30	2	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	1		
July	5,069	151	2.98	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
August	5,113	196	3.83	3	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1		
September	5,084	258	5.07	4	-	-	-	1	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1		
October	4,633	311	6.71	4	-	-	-	2	1	-	-	-	-	-	-	-	1	-	1	-	-	-	-	-	-		
November	4,689	335	7.14	2	-	-	-	1	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-		
December	4,103	210	5.12	5	-	-	-	1	-	-	-	-	-	1	-	-	1	-	2	-	-	-	-	-	-		
						-	-	7	4	1	1	-	-	2	1	-	8	1	3	-	-	-	-	4	2		
Died per 1,000 of Average Strength.																											
the Year	4,984	217	4.35	34	6.82	-	-	1.41	.80	.20	.20	-	-	.40	.20	-	1.61	.20	.60	-	-	-	-	.80	.40		

CAUSES OF ADMISSIONS.	NUMBER OF ADMISSIONS INTO HOSPITAL IN EACH MONTH.												Total Admissions during the Year.	Admitted per Cent. of Average Strength.	Died per Cent. of Admissions.												
	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.															
Cholera	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6	.12	-	-	-	-	-	-			
Small-pox	1	2	2	1	-	-	-	-	-	-	-	-	-	-	-	-	6	.12	-	-	-	-	-	-			
Fever, intermittent	134	128	150	223	202	154	143	306	351	515	615	250	3,171	63.62	-	-	67	1.35	-	-	-	-	-	.37			
Fever, remittent	2	8	-	10	8	3	1	3	3	15	14	-	3	.06	-	-	3	.06	-	-	-	-	-	-			
Fever, continued	1	-	1	-	-	1	-	-	-	-	-	-	1	.02	-	-	1	.02	-	-	-	-	-	-			
Apoplexy	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
Delirium tremens	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
Dysentery	18	6	15	8	19	7	8	16	24	8	33	8	170	3.41	-	-	8	3.41	-	-	-	-	-	-			
Diarrhea	5	2	2	6	13	13	6	32	25	9	6	11	130	2.61	-	-	11	2.61	-	-	-	-	-	1.54			
Hepatitis	1	-	1	-	-	-	-	-	-	-	-	2	5	.10	-	-	2	.10	-	-	-	-	-	40.00			
Spleen disease	3	5	6	4	2	1	2	2	3	4	7	2	41	.82	-	-	2	.82	-	-	-	-	-	-			
Respiratory diseases	14	24	17	16	8	11	9	13	9	5	18	10	154	3.09	-	-	10	3.09	-	-	-	-	-	5.19			
Phthisis pulmonalis	1	-	-	-	1	-	-	-	1	-	-	2	5	.10	-	-	2	.10	-	-	-	-	-	60.00			
Dropsy	-	-	-	-	-	-	-	-	1	-	-	-	1	.02	-	-	-	.02	-	-	-	-	-	-			
Scurvy	43	33	32	12	11	15	13	24	20	16	14	16	249	5.00	-	-	16	5.00	-	-	-	-	-	-			
Atrophy and anemia	33	39	35	28	37	26	31	34	25	30	37	18	373	7.49	-	-	18	7.49	-	-	-	-	-	-			
Wounds and accidents	4	7	8	15	16	9	12	10	11	8	14	6	120	2.41	-	-	6	2.41	-	-	-	-	-	-			
Other causes	64	78	64	58	54	47	67	100	116	88	62	53	851	17.08	-	-	53	17.08	-	-	-	-	-	.22			
	69	38	31	46	62	35	53	71	64	48	63	56	636	12.76	-	-	56	12.76	-	-	-	-	-	-			
	34	82	47	42	53	25	30	41	30	17	30	24	455	9.13	-	-	24	9.13	-	-	-	-	-	-			
	427	452	411	469	487	347	375	652	683	763	914	458	6,438														
Admitted per Cent. of Average Strength in each Month.																											
	8.07	8.02	8.06	9.22	9.79	6.90	7.40	12.75	13.44	16.47	19.49	11.16	129.19														

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* As in the case of the gaol population, the dysentery and diarrhoea of the Native Army should be entered under one heading, Troops returning to cantonments after the conclusion of the Eusufzai campaign, and on the march to Bhootai; and regiments on the march in the course of the annual relief.

* As in the case of the gaol population, the dysentery and diarrhoea of the Native Army should be entered under one heading.

2.—NATIVE TROOPS, 1864—continued.

STATEMENT showing the DAILY AVERAGE SICK RATE of each Station in each Month, and the Ratio in which the Chief Diseases have contributed to make up the ANNUAL ADMISSION RATE of the STATIONS of the Presidency.

STATIONS.	DAILY SICK PER CENT. OF AVERAGE STRENGTH IN EACH MONTH.												Average Strength for the Period of Observation.	ADMITTED INTO HOSPITAL PER CENT. OF AVERAGE STRENGTH.												
	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.		Average Daily Sick per Cent. for the Year.	Cholera.	Fever.	Dysentery.	Diarrhoea.	Hepatitis.	Spleen.	Ophthalmia.	Rheumatism.	Veneral Diseases.	Diseases of the Respiratory Organs.	All other Causes.	
Fort William	3.58	2.02	2.94	1.75	2.91	1.67	2.24	3.34	3.40	2.97	4.63	8.06	3.29	4.01	51.29	13.75	15.47	-	.86	.29	2.86	6.02	4.30	14.04	112.89	
Alipore	6.90	5.97	5.84	5.65	4.87	5.19	5.62	5.03	5.50	5.56	4.93	8.26	5.85	1.39	30.21	15.45	10.94	-	.52	.69	8.16	5.21	6.08	28.99	107.64	
Barrackpore	1.341	2.15	2.42	2.99	4.08	4.04	4.33	4.60	5.30	4.16	5.95	3.37	2.49	3.66	65.10	8.05	11.78	.22	1.42	1.27	5.30	5.44	3.38	28.86	131.32	
Barhampton	1.71	.86	1.61	1.21	1.81	1.58	1.60	6.85	10.82	8.21	15.92	14.34	4.91	-	152.05	6.43	19.88	-	1.17	1.17	1.17	2.34	1.17	14.62	200.00	
Dacca (9 months)	584	-	-	-	5.45	5.67	5.66	5.19	5.88	5.61	4.52	5.20	5.63	6.85	62.84	10.28	26.71	.17	.17	.34	1.88	2.37	2.40	12.16	126.37	
Chittagong	333	13.54	13.57	16.78	20.36	13.54	13.40	12.53	13.47	11.10	16.85	20.45	14.89	-	291.59	12.61	9.91	.30	2.40	1.20	8.41	4.81	4.81	81.08	420.12	
Cherapoonjee	412	3.39	3.51	4.19	2.72	2.96	4.18	3.02	5.33	2.72	2.65	2.49	3.35	.24	257.33	9.22	3.64	-	.24	.97	4.37	3.16	2.67	19.66	69.90	
Sylhet and Jowai	455	9.03	9.75	6.14	4.13	7.09	7.61	7.15	7.38	7.50	7.73	9.63	8.72	7.51	2.86	81.76	24.18	.44	.44	2.20	9.45	8.35	7.69	35.82	197.14	
Gowalparah	188	4.74	2.02	1.74	.47	2.27	1.17	1.30	4.00	4.39	5.79	4.08	7.54	8.15	1.06	59.57	10.11	7.45	.53	2.66	1.60	2.13	7.98	2.66	17.55	113.30
Gowhatry	361	.65	.87	1.83	1.00	.78	.40	2.12	1.19	1.97	1.32	1.67	1.63	1.32	1.38	28.53	7.48	4.99	.28	1.66	.83	1.11	1.94	1.38	11.36	60.94
Tezpor (9 months)	210	-	-	-	3.29	3.30	6.14	5.88	1.31	5.70	7.35	7.32	5.79	.48	145.21	3.81	14.76	-	.48	.95	4.76	3.81	2.86	4.28	220.95	
Debrooghur	647	5.67	5.86	2.63	3.44	2.73	3.46	5.07	7.55	7.46	8.37	7.04	5.41	.46	85.16	11.28	11.90	-	.98	2.16	12.52	1.55	5.41	52.45	183.92	
Jalpigoree	883	5.51	4.62	3.84	4.10	4.64	4.74	4.43	4.48	4.09	4.46	5.29	7.67	4.88	.57	60.47	13.25	17.44	.23	.79	2.04	2.04	3.85	48.47	157.19	
Bhaugulpore	465	2.50	2.81	1.71	2.13	2.78	2.31	1.55	1.78	1.15	2.11	1.71	1.25	1.99	-	45.81	5.59	14.84	-	1.07	1.50	.86	-	63.66	133.33	
Doranda	602	1.77	3.28	4.35	3.02	3.05	2.97	4.64	5.84	5.46	4.49	4.06	3.57	3.86	-	67.28	10.96	.17	-	.66	2.33	4.32	2.49	3.65	18.77	110.63
Dinapore	587	1.24	.86	1.34	2.18	1.67	2.20	1.14	2.62	1.81	3.45	1.94	1.21	1.77	.85	37.31	1.19	2.05	-	1.19	.34	3.75	1.36	1.53	19.93	69.50
Segowlee	355	4.51	4.47	3.78	3.68	2.92	2.38	2.64	4.15	4.03	4.14	3.21	3.55	.54	24.23	5.15	1.41	.56	.56	1.97	6.20	17.75	4.79	19.72	82.54	
Benares	551	2.80	3.12	1.96	3.88	4.17	6.15	4.05	3.66	4.66	4.12	2.65	3.62	.54	41.74	8.17	2.72	.54	.36	3.63	5.63	5.63	2.00	39.20	110.16	
Gonuckpore	630	3.23	3.21	2.54	2.36	3.09	3.25	3.02	3.13	3.08	3.21	3.28	3.07	-	49.84	8.57	2.22	-	.16	2.86	6.19	4.13	2.22	25.71	101.90	
Fyzabad (7 months)	679	-	-	-	-	2.89	2.88	3.01	2.93	3.16	3.66	3.42	3.19	.15	33.77	3.97	3.02	-	.30	1.03	4.12	3.53	2.65	16.79	79.82	
Lucknow	1,888	2.39	3.21	3.09	4.44	4.62	3.57	3.68	4.34	2.37	2.57	2.23	3.37	.21	17.57	3.97	1.67	.21	.94	1.45	3.97	2.52	3.21	41.06	96.10	
Seetapore (9 months)	478	2.33	2.44	2.82	2.39	3.33	3.38	2.16	2.84	2.38	-	-	2.69	.21	16.33	1.88	2.64	.13	.38	2.51	2.64	3.83	2.61	17.09	55.02	
Cawnpore (10 months)	736	3.41	4.01	2.77	1.85	2.16	1.75	1.51	1.73	1.92	2.33	-	2.38	.52	90.86	9.66	3.66	.26	.36	1.83	3.66	3.39	3.91	39.95	50.13	
Banda	383	3.15	4.38	4.09	3.87	2.81	2.35	2.92	3.39	11.31	6.06	3.49	4.11	.52	90.86	9.66	3.66	.26	.36	1.83	3.66	3.39	3.91	39.95	161.36	
Humeerpore	431	4.36	3.67	3.02	2.87	2.80	3.53	3.86	3.32	5.31	5.74	5.30	5.87	4.25	-	83.06	11.60	2.09	.70	.23	6.03	6.49	3.25	52.67	169.37	
Nagode	570	4.70	4.25	4.94	5.35	2.87	1.22	1.30	1.41	1.84	9.30	10.88	7.70	3.91	.18	21.40	.70	1.58	-	.18	1.05	2.45	2.63	.88	34.21	65.26
Allahabad (10 months)	318	2.94	2.80	2.69	-	4.85	4.84	5.22	4.53	5.16	4.68	4.42	4.00	.19	25.29	3.09	2.90	.38	.32	1.74	3.67	6.56	2.90	24.52	71.43	
Shahjampore	309	3.70	3.78	3.25	3.83	4.67	3.92	4.62	5.53	4.41	3.46	3.43	3.87	.32	37.22	3.56	1.94	-	.32	1.30	9.71	8.09	3.56	74.11	140.13	
Barilly	866	4.55	4.36	3.64	4.15	2.81	2.11	3.81	4.88	3.78	4.59	3.48	3.82	.23	34.18	5.43	2.19	.23	.30	3.00	7.62	5.08	5.20	41.57	104.73	
Roorkee and Camp Munghour (9 months)	895	-	5.57	5.30	5.66	4.10	3.50	3.42	3.23	6.19	4.38	4.93	4.36	.22	38.44	5.03	3.35	-	1.01	8.94	6.59	3.80	3.57	33.74	104.69	
Almorah (9 months)	524	-	-	2.25	1.86	2.17	3.63	3.37	2.77	2.43	2.94	2.53	2.61	-	46.95	.88	3.24	-	-	2.29	3.24	7.82	1.53	21.95	87.40	
Moradabad (9 months)	391	-	1.20	2.48	2.78	3.00	2.84	2.75	2.75	2.91	3.79	3.28	3.00	.26	21.71	2.56	1.33	-	.51	3.58	4.35	7.42	1.28	29.92	73.15	
Meerut	817	1.50	-	-	-	-	-	-	-	-	-	-	-	-	25.09	3.67	1.71	.37	.61	4.41	4.41	5.87	3.43	40.27	89.84	
Allypore (9 months)	411	-	-	2.23	1.62	1.04	1.16	2.81	1.08	1.10	1.17	1.32	1.58	-	13.87	.97	1.70	-	-	.25	3.65	3.65	.73	12.65	37.47	
Delhi	547	8.05	5.21	9.98	13.33	13.39	10.18	7.34	10.58	12.03	11.85	10.08	4.21	9.59	-	95.43	8.77	2.19	-	1.65	1.10	5.12	4.39	6.76	125.23	250.64
Agra	618	4.08	3.49	3.93	5.32	5.74	4.74	5.05	4.65	5.53	4.94	8.90	8.86	5.57	-	74.92	3.40	2.10	.06	.65	4.85	5.66	8.09	2.27	40.94	142.88
Morar	1,582	3.11	4.73	4.26	4.57	4.17	3.04	2.33	3.30	4.07	6.74	7.73	6.25	4.38	-	66.44	2.06	2.85	.06	1.64	1.83	4.08	7.14	4.36	48.04	139.70
Jhansi	1,109	1.67	1.93	2.22	1.99	1.91	1.56	2.06	2.32	3.70	3.28	3.34	2.60	2.38	-	49.59	4.06	1.62	.36	.36	3.07	4.69	7.49	1.80	26.60	99.64
Nowong	1,669	5.68	3.20	2.61	1.85	2.51	3.25	3.15	3.54	4.34	6.00	4.25	2.80	3.74	-	43.50	1.92	.85	-	1.49	1.71	7.67	4.90	2.56	35.61	100.21
Lullipore (11 months)	709	5.89	4.18	5.67	2.77	4.01	4.25	3.53	5.67	6.40	3.16	11.52	2.80	3.74	-	96.33	5.22	1.83	-	-	1.27	2.82	7.62	2.12	23.11	140.62
Deolee	460	6.10	4.50	4.12	3.88	6.00	4.83	3.70	5.40	6.07	4.61	4.27	5.01	5.05	-	48.04	2.17	8.04	-	-	1.96	6.31	10.00	5.22	64.35	146.09
Umballa	683	1.90	4.60	3.45	5.50	4.99	5.32	3.11	3.09	4.84	3.95	2.63	3.87	3.99	-	33.24	4.69	4.10	.29	.44	6.44	5.12	4.39	36.90	103.37	
Jullundur (9 months)	438	-	-	-	1.26	1.51	1.64	5.56	6.84	7.65	6.99	7.31	6.15	5.77	-	35.85	2.28	2.28	-	.68	1.83	6.85	3.43	5.48	33.97	82.65
Ferozepore	694	2.13	3.03	3.72	3.03	2.84	2.14	3.12	2.56	2.45	2.27	2.16	2.65	-	29.88	1.44	3.31	.29	.68	4.03	4.03	3.75	3.03	33.57	8	

* Strength varied throughout the Year from 200 to 600.

2.—NATIVE TROOPS, 1864—continued.

TABLE showing the MORTALITY in each STATION, the CAUSES of DEATH, and the Ratio of DEATHS to STRENGTH

STATIONS.	Average Strength during the period of Observation.	CAUSES OF DEATHS IN HOSPITAL.																			DIED PER 1,000 OF AVERAGE STRENGTH.									
		Cholera.	Small-pox.	Fever, Intermittent.	Fever, Remittent.	Fever, Continued.	Apoplexy.	Delirium Tremens.	Dysentery, Acute.	Dysentery, Chronic.	Diarrhoea.	Hepatitis, Acute.	Hepatitis, Chronic.	Spleen Disease.	Respiratory Diseases.	Heart Diseases.	Phthisis Pulmonalis.	Dropsy.	Scurvy.	Atrophy and Anemia.	Wounds and Accidents.	All other Causes.	Died out of Hospital.	Total Deaths of the Year.	B. All other Causes.		C. All Causes.			
																									A. Cholera.	1. 2.				
																										In Hospital.	Out of Hospital.			
Fort William	319	5	-	1	-	-	1	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	11	14.32	17.20	-	31.52		
Alipore -	576	3	-	2	-	-	-	-	-	-	2	-	-	-	3	-	-	-	-	-	-	-	-	14	5.21	19.10	-	24.31		
Ballygunge -	39	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	25.64	-	-	25.64		
Barrackpore -	1,341	3	-	1	1	1	1	-	2	2	3	-	-	1	-	-	2	1	-	-	2	1	-	22	2.24	14.17	-	16.41		
Berhampore -	171	-	-	1	-	-	-	-	-	-	3	-	-	-	-	-	-	-	-	-	-	-	-	3	-	17.54	-	17.54		
Dacca (9 months)	584	21	-	-	1	-	-	-	-	-	7	-	-	-	-	-	-	-	-	-	-	-	-	32	35.96	18.82	-	54.78		
Chittagong -	333	-	-	5	-	-	-	-	-	-	1	-	-	-	-	-	-	1	-	-	-	-	-	10	-	30.03	-	30.03		
Cherrapunjee -	412	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3	-	7.28	-	7.28		
Cachar (7 months)	168	-	-	1	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	2	-	11.90	-	11.90		
Sylhet and Jowai -	455	10	-	1	-	-	-	-	1	1	3	-	-	-	4	1	-	1	-	-	-	-	1	25	21.97	30.78	2.20	54.95		
Gowalparah -	188	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	10.64	-	-	10.64		
Gowhaty -	361	2	-	-	-	-	-	-	1	-	-	-	-	-	1	-	-	-	-	-	-	-	-	5	5.54	8.31	-	13.85		
Nowgong (8 months)	139	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Tezporo (9 months)	210	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	9.52	-	9.52		
Debrooghur -	647	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	1	5	6.19	1.54	7.73		
Bhootan Field Force	-	3	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	6	1.56	.52	1.04		
Julpigoree -	883	1	1	9	1	-	-	-	-	-	-	-	-	1	-	-	1	-	1	1	-	-	-	16	1.13	16.99	-	18.12		
Bhaugulpore -	465	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Dorundah -	602	-	-	5	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	6	-	9.97	-	9.97		
	7,929	51	1	27	7	1	3	-	11	3	21	-	-	1	10	1	4	3	1	4	2	10	4	165	6.43	13.88	.50	20.81		
Dinapore -	587	1	-	-	-	-	-	-	-	-	1	-	-	-	1	-	-	1	-	-	1	1	-	6	1.70	8.52	-	10.22		
Segoviee -	355	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	4	8.45	2.82	11.27		
Benares -	551	2	-	2	-	-	-	-	1	1	1	-	-	-	1	-	-	1	-	-	-	-	-	8	3.63	10.89	-	14.52		
Goruckpore -	636	-	-	1	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	1	-	-	5	-	7.94	-	7.94		
Fyzabad (7 months)	679	2	4	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	7	2.95	7.36	-	10.31		
Lucknow -	1,588	1	-	-	3	-	-	-	-	-	-	-	-	1	3	-	-	-	-	-	-	-	-	1	10	.63	.63	6.30		
Seetapore (9 months)	478	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	1	-	-	-	-	-	-	-	-	6.27	-	6.27	
Cawnpore (10 months)	796	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	-	-	-	-	-	-	-	-	5.03	-	5.03	
Banda -	383	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5.22	-	5.22	
Humeerpore -	481	-	1	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	9.28	-	9.28	
Nagodee -	570	-	-	1	1	-	-	-	-	-	-	-	-	-	1	2	-	-	-	-	-	-	-	-	-	-	8.77	-	8.77	
Allahabad (10 months)	518	2	-	-	2	-	-	-	-	-	1	-	-	-	1	-	-	-	-	-	-	-	-	-	6	3.86	7.72	-	11.58	
	6,945	8	5	4	7	-	-	-	4	1	3	2	-	2	11	3	2	2	-	-	4	4	2	64	1.15	7.79	.26	9.22		
Shahjehanpore	309	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	1	-	-	-	-	-	-	3	-	9.71	-	9.71		
Barailly -	866	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	7	8.08	-	8.08		
Roorkee (10 months)	895	-	-	1	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	3	2.23	1.12	3.35	
Almorah (9 months)	524	-	-	-	2	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	1	4	8.72	1.91	7.63	
Deyrah (11 months)	120	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	8.33	-	8.33	
Moradabad (9 months)	391	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	7.67	-	7.67	
Meerut -	817	-	1	1	2	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	7	8.57	-	8.57
Allyghur (9 months)	411	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2.43	-	2.43	
Delhi -	547	-	-	1	9	-	-	-	-	-	1	-	-	-	4	2	-	-	-	-	-	-	-	-	2	1	34.73	1.82	36.56	
	4,388	-	1	5	11	1	1	-	-	1	1	-	-	1	9	2	3	-	-	-	1	9	3	49	-	10.49	.68	11.17		
Agra -	618	-	-	2	-	-	1	-	-	-	-	-	-	-	1	1	1	-	-	-	-	-	-	2	8	-	9.71	3.23	12.94	
Morar -	1,582	-	-	2	1	1	-	-	-	-	-	-	-	-	5	-	-	-	-	-	-	-	-	-	-	-	8.22	-	8.22	
Jhansi -	1,109	-	-	1	1	-	-	-	-	-	1	1	-	-	1	-	-	-	-	-	-	-	-	-	-	-	4.51	-	4.51	
Nowgong -	69	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2.13	-	2.13	
Lullulpore (11 months)	99	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2.82	-	2.82	
Jubbulpore (10 months)	15	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	17.39	-	17.39	
Deolce -	460	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6.62	-	6.62	
	4,984	-	-	7	4	1	1	-	-	-	2	1	-	-	8	1	3	-	-	-	-	4	2	34	-	6.42	.40	6.82		
Umballa -	683	-	-	2	-	-	-	-	3	-	2	-	-	-	1	1	-	-	-	-	-	-	-	-	9	-	13.17	-	13.17	
Jullundur (9 months)	438	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4.57	-	4.57	
Ferozepore -	694	-	-	2	3	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	11.53	-	11.53	
Umritaur (9 months)	451	1	-	-	2	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	6.05	-	6.05	
Dhumsalla (11 months)	716	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3	-	4.19	
Mean Meer -	1,288	-	-	1	-	-	-	-	-	-	3	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	7.76	-	7.76
Mooltan -	990	-	-	-	2	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	8	-	8.08	
Rawul Pindoe	1,391	-	-	3	2	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	1	1	1	12	-	-	-	7.91	.72	8.63
Peshawur -	1,134	-	4	22	2	3	-	-	12	-	7	-	-	-	7	-	-	-	-	-	-	1	4	2	64	-	15.00	.48	15.48	
	10,504	1	4	32	11	3	-	-	18	1	12	-	-	-	17	1	7	-	-	-	2	8	3	120	6.9	11.04	.29	11.42		
Troops on the March (7 months)	4,114	2	-	9	11	2	-	-	2																					

2.—NATIVE TROOPS, 1864—continued.

TABLE showing the prevalence of SMALL-POX and CHOLERA in each Month, and the Distribution of those Epidemics by STATIONS and PROVINCES.

S T A T I O N S.		Average Strength.	S M A L L - P O X.												Total Admissions of the Year.	Deaths of the Year.	Died per 1,000 of Strength.
			NUMBER OF ADMISSIONS INTO HOSPITAL IN EACH MONTH.														
			Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.			
Fort William		349	-	-	-	-	-	-	-	-	-	-	-	-	14	5	6.43
Alipore		576	-	-	-	-	-	-	-	-	-	-	-	-	8	3	
Ballyunga		39	-	-	-	-	-	-	-	-	-	-	-	-	2	1	
Barrackpore		1,341	-	-	-	-	-	-	-	-	-	-	-	-	8	1	
Berhampore		171	-	-	-	-	-	-	-	-	-	-	-	-	2	3	
Bacca (9 months)		584	-	-	-	-	-	-	-	-	-	-	-	-	40	21	
Chittagong		333	-	-	-	-	-	-	-	-	-	-	-	-	1	-	
Cherrapunjee		412	-	-	-	-	-	-	-	-	-	-	-	-	1	-	
Cachar (7 months)		168	-	-	-	-	-	-	-	-	-	-	-	-	13	10	
Cyhet and Jowai		455	-	-	-	-	-	-	-	-	-	-	-	-	2	2	
Gowalparah		188	-	-	-	-	-	-	-	-	-	-	-	-	5	2	
Gowhaty		561	-	-	-	-	-	-	-	-	-	-	-	-	1	-	
Nowgong Assam (8 months)		139	-	-	-	-	-	-	-	-	-	-	-	-	18	9	
Tezpur (9 months)		210	-	-	-	-	-	-	-	-	-	-	-	-	2	2	
Dibrugarh		647	-	-	-	-	-	-	-	-	-	-	-	-	5	1	
Bhojpur Field Force (2 months)		1,922	-	-	-	-	-	-	-	-	-	-	-	-	8	3	
Jalpigoree		883	-	-	-	-	-	-	-	-	-	-	-	-	7	1	
Bhangulpore		465	-	-	-	-	-	-	-	-	-	-	-	-	5	1	
Dorundah		602	-	-	-	-	-	-	-	-	-	-	-	-	5	1	
Dinapore		587	-	-	-	-	-	-	-	-	-	-	-	-	7	3	
Segowlee		355	-	-	-	-	-	-	-	-	-	-	-	-	5	1	
Benares		551	-	-	-	-	-	-	-	-	-	-	-	-	5	1	
Goruckpore		680	-	-	-	-	-	-	-	-	-	-	-	-	3	1	
Syzabad (7 months)		679	-	-	-	-	-	-	-	-	-	-	-	-	1	1	
Lucknow		1,588	-	-	-	-	-	-	-	-	-	-	-	-	1	1	
Seoapore (9 months)		478	-	-	-	-	-	-	-	-	-	-	-	-	2	2	
Cawnpore (10 months)		795	-	-	-	-	-	-	-	-	-	-	-	-	1	1	
Banda		383	-	-	-	-	-	-	-	-	-	-	-	-	2	2	
Humeerpore		431	-	-	-	-	-	-	-	-	-	-	-	-	1	1	
Nagode		570	-	-	-	-	-	-	-	-	-	-	-	-	1	1	
Allahabad (10 months)		518	-	-	-	-	-	-	-	-	-	-	-	-	2	2	
Shahjahanpore		300	-	-	-	-	-	-	-	-	-	-	-	-	2	2	
Barilly		866	-	-	-	-	-	-	-	-	-	-	-	-	1	1	
Roorkee (10 months)		895	-	-	-	-	-	-	-	-	-	-	-	-	2	2	
Almorah (9 months)		524	-	-	-	-	-	-	-	-	-	-	-	-	1	1	
Deyrah (11 months)		120	-	-	-	-	-	-	-	-	-	-	-	-	2	2	
Moradabad (9 months)		391	-	-	-	-	-	-	-	-	-	-	-	-	1	1	
Meerut		817	-	-	-	-	-	-	-	-	-	-	-	-	1	1	
Allyghur (9 months)		411	-	-	-	-	-	-	-	-	-	-	-	-	1	1	
Dehli		547	-	-	-	-	-	-	-	-	-	-	-	-	1	1	
Agra		618	-	-	-	-	-	-	-	-	-	-	-	-	1	1	
Moras		1,532	-	-	-	-	-	-	-	-	-	-	-	-	2	2	
Jhansi		1,109	-	-	-	-	-	-	-	-	-	-	-	-	1	1	
Nowgong		469	-	-	-	-	-	-	-	-	-	-	-	-	1	1	
Luluitpore (11 months)		709	-	-	-	-	-	-	-	-	-	-	-	-	1	1	
Jubbulpore (10 months)		115	-	-	-	-	-	-	-	-	-	-	-	-	1	1	
Dsotee		460	-	-	-	-	-	-	-	-	-	-	-	-	1	1	
Umhalla		683	-	-	-	-	-	-	-	-	-	-	-	-	1	1	
Jullundur (9 months)		438	-	-	-	-	-	-	-	-	-	-	-	-	1	1	
Ferozepore		694	-	-	-	-	-	-	-	-	-	-	-	-	1	1	
Umritsaur (9 months)		451	-	-	-	-	-	-	-	-	-	-	-	-	1	1	
Dhurnasalla (11 months)		716	-	-	-	-	-	-	-	-	-	-	-	-	1	1	
Meeran Meer		1,268	-	-	-	-	-	-	-	-	-	-	-	-	1	1	
Mooltan		900	-	-	-	-	-	-	-	-	-	-	-	-	1	1	
Rawal Pindie		1,391	-	-	-	-	-	-	-	-	-	-	-	-	1	1	
Peshawar		4,134	-	-	-	-	-	-	-	-	-	-	-	-	9	2	
Troops on the March (7 months)		-	2	4	3	3	12	6	1	2	1	-	2	10	46	11	
BENGAL PRESIDENCY		-	-	-	-	-	-	-	-	-	-	-	-	-	7	62	
															141	62	
																1.67	

3.—GAOLS OF THE BENGAL PRESIDENCY, 1864.

TABLE showing the SICKNESS and MORTALITY among the GAOL POPULATION of the Bengal Presidency during the Year 1864, and the Prevalence of the Principal Diseases in each Month of the Year.

MONTHS.	Average Strength.	Average Number Daily Sick.	Number Daily Sick per Cent. of Strength.	Number of Deaths.	Died per 1,000 of Average Strength.	CAUSES OF DEATHS IN HOSPITAL.															
						Cholera.	Small-pox.	Fevers.	Apoplexy.	Dysentery.	Diarrhoea.	Hepatitis.	Spleen Disease.	Respiratory Diseases.	Heart Diseases.	Phthisis Pulmonalis.	Dropsy.	Scurvy.	Atrophy and Anæmia.	Wounds and Accidents.	All other Causes.
January -	52,277	2,358	4.51	399	-	3	1	120	5	89	81	1	-	22	1	15	4	2	25	2	28
February -	52,278	2,306	4.41	338	-	20	3	152	1	41	37	1	4	13	-	8	8	2	19	3	26
March -	51,984	2,493	4.79	382	-	53	2	175	2	60	32	-	2	18	3	3	5	-	6	1	20
April -	51,972	2,592	4.99	496	-	151	2	214	2	48	33	-	-	10	-	6	5	-	6	3	16
May -	52,196	2,115	4.05	282	-	58	-	107	-	39	23	1	4	11	1	6	4	-	9	1	18
June -	52,270	1,982	3.79	282	-	81	1	62	11	41	36	3	1	7	-	8	6	-	7	3	12
July -	52,873	1,849	3.50	172	-	23	-	30	2	38	22	1	1	7	-	13	4	-	10	-	21
August -	53,132	1,997	3.76	223	-	31	-	26	1	55	44	1	2	11	-	13	5	2	9	1	19
September -	53,309	2,160	4.05	269	-	1	1	68	-	75	67	-	1	7	-	4	3	-	16	7	19
October -	53,196	2,306	4.33	286	-	3	-	70	3	63	81	1	4	19	3	5	5	-	11	-	18
November -	53,035	2,001	3.77	269	-	14	-	61	3	62	67	-	-	12	2	5	3	-	11	4	22
December -	52,657	1,840	3.50	263	-	6	-	75	3	58	72	1	2	12	1	4	-	-	12	-	17
						450	10	1,163	33	669	595	10	21	149	11	90	52	6	141	25	236
Died per 1,000 of Average Strength.																					
for the Year -	52,598	2,167	4.12	3,661	69.60	8.56	.19	22.11	.63	12.72	11.31	.19	.40	2.83	.21	1.71	.99	.11	2.68	.48	4.48

Died out of Hospital, 31. Per 1,000 of Average Strength, .59.

DISEASES.	NUMBER OF ADMISSIONS INTO HOSPITAL IN EACH MONTH.												Total Admissions during the Year.	Admitted per Cent. of Average Strength.	Died per Cent. of Admissions.
	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.			
Cholera -	6	53	175	382	155	234	52	88	11	12	25	13	1,206	2.29	37.31
Small-pox* -	29	258	106	38	35	18	5	3	1	5	29	48	575	1.09	1.74
Fevers -	2,121	2,170	2,666	2,453	2,034	1,740	1,745	2,225	2,672	3,079	2,286	1,859	27,050	51.43	4.30
Apoplexy -	7	3	3	3	1	12	4	1	2	3	2	4	45	.09	73.33
Trismus Tremens -	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dysentery and Diarrhoea -	809	649	880	1,157	1,007	923	970	1,323	1,198	1,075	939	725	11,655	22.16	10.85
Hepatitis -	8	6	2	4	5	5	10	9	6	5	7	7	74	.14	13.51
Heart Disease -	37	33	27	22	28	25	16	20	25	25	32	35	325	.62	6.46
Respiratory Diseases -	167	173	141	115	123	131	99	112	108	131	132	167	1,602	3.05	9.30
Phthisis Pulmonalis -	18	14	17	13	15	22	12	17	9	7	3	5	152	.29	59.21
Dropsy -	25	25	17	12	15	15	14	11	11	9	15	20	189	.36	27.51
Anæmia and Anæmia -	97	63	36	40	51	35	38	41	47	43	38	33	562	1.07	25.10
Scurvy -	12	7	12	15	25	7	18	10	11	22	9	10	158	.30	3.80
Eumatiem -	119	121	117	132	114	125	127	131	141	103	120	127	1,477	2.81	-
Mercurial Diseases -	108	82	106	87	87	106	103	95	96	80	69	82	1,101	2.09	-
Other Diseases -	39	51	58	94	124	133	139	110	72	114	99	46	1,079	2.05	-
Scars and Ulcer -	583	636	648	563	625	641	776	705	672	620	480	437	7,386	14.04	1.29
Wounds and Accidents -	110	152	186	180	203	185	190	183	158	147	146	118	1,958	3.72	-
All other Causes -	694	731	864	759	682	686	655	681	599	555	511	541	7,958	15.13	-
	4,989	5,227	6,061	6,069	5,329	5,043	4,973	5,765	5,839	6,038	4,942	4,277	61,552		
Admitted per Cent. of Average Strength in each Month.															
	9.54	10.00	11.66	11.68	10.21	9.65	9.41	10.85	10.95	11.35	9.32	8.12	122.73		

* It has not been considered expedient to introduce in this series, the Table showing the prevalence of small-pox in 1864 in each of the gaols of the Presidency. Although true small-pox appeared widely as an epidemic in nearly every Province, the deaths among the gaol population were limited to six gaols;—the Patna, Benares, Mirzapore, and Nursingpore Gaols, which afforded each a fatal case. The Mymensing Gaol, which had two deaths, and the Dacca Gaol, which had four deaths from small-pox: these 10 deaths represent the total mortality for the year. Of the 575 cases noted as Variola, 520 occurred in the gaols of Bengal Proper; but, although returned as Variola, the disease appears to have been a mild Varioloid, and the ratio of deaths to admissions is, therefore, an untrue ratio for genuine small-pox. Many cases of Variella are recorded in the same gaols, while other gaols of the Province appear to have been attacked by Variella only; 333 cases were returned as Variella, with no casualty.

3.—GAOLS OF THE BENGAL PRESIDENCY, 1864—continued.

TABLE showing the SICKNESS and MORTALITY among the GAOL POPULATION in the *Dinapore, Benares, Oude, and Carnpore* Districts during the Year 1864, and the Prevalence of the Principal Diseases in each Month of the Year.

MONTHS.	Average Strength.	Average Number Daily Sick.	Daily Sick per Cent. of Average Strength.	Number of Deaths.	Died per 1,000 of Average Strength.	CAUSES OF DEATHS IN HOSPITAL.																	
						Cholera.	Small-pox.	Fever, Intermittent.	Fever, Remittent.	Fever, Continued.	Apoplexy.	Dysentery.	Diarrhoea.	Hepatitis.	Spleen Disease.	Respiratory Diseases.	Heart Diseases.	Phthisis Pulmonalis.	Dropsy.	Scurvy.	Atrophy and Anæmia.	Wounds and Accidents.	All other Causes.
January -	14,972	471	3.15	93	-	-	-	2	4	-	2	22	44	-	-	-	-	2	-	1	7	1	8
February -	15,105	416	2.75	60	3	1	1	10	-	-	1	7	20	-	-	1	2	1	-	-	1	2	10
March -	15,199	465	3.06	61	1	-	-	3	12	2	1	16	17	-	1	4	-	2	-	-	-	-	2
April -	15,573	465	2.98	106	28	1	3	27	1	-	-	17	20	-	-	2	-	1	-	-	-	-	6
May -	15,623	492	3.15	85	20	-	6	16	-	-	-	10	13	-	2	4	-	3	-	-	3	-	8
June -	15,555	489	3.14	107	47	1	3	2	5	6	-	13	19	1	1	1	-	3	1	-	1	-	3
July -	15,694	467	2.97	56	9	-	4	5	2	-	-	16	7	-	1	1	-	4	-	-	2	-	5
August -	15,577	579	3.72	99	26	-	1	4	-	-	-	20	31	-	1	2	-	6	-	1	-	1	6
September -	15,383	550	3.58	103	-	1	4	5	-	-	-	40	40	-	1	1	-	1	-	-	2	-	8
October -	15,523	512	3.29	102	1	-	3	5	-	-	2	21	51	-	1	7	-	1	-	-	3	-	7
November -	15,665	448	2.86	80	1	-	4	1	2	-	-	22	35	-	-	2	-	2	1	-	-	1	9
December -	15,534	389	2.50	85	-	-	-	9	1	-	1	21	38	-	1	4	-	1	-	-	-	-	9
						136	3	43	92	12	12	225	335	1	10	30	-	27	4	2	19	5	81
Died per 1,000 of Average Strength.																							
the } Year -	15.450	479	3.10	1,037	67.12	8.80	.19	2.78	5.96	.78	.78	14.56	21.68	.07	.65	1.94	-	1.75	.26	.13	1.23	.32	5.24

Deaths out of Hospital, 7. Died per 1,000 of Average Strength, .45.

DISEASES.	NUMBER OF ADMISSIONS INTO HOSPITAL IN EACH MONTH.												Total Admissions during the Year.	Admitted per Cent. of Average Strength.	Died per Cent. of Admissions.
	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.			
Cholera -	-	6	10	101	56	148	15	53	2	1	1	1	394	2.55	31.52
Small-pox -	6	5	4	3	7	5	-	-	1	-	2	-	33	.21	9.09
Fever, Intermittent -	217	229	285	352	310	293	282	375	384	444	346	252	3,769	24.40	1.11
Remittent -	50	72	122	134	76	49	45	47	53	36	14	19	717	4.64	14.50
Continued -															
Apoplexy -	2	-	1	2	-	6	-	-	1	3	-	1	16	.10	75.00
Irregular Tremors -	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Gonorrhoea and Diarrhoea -	284	216	244	302	274	249	271	526	426	350	267	238	3,647	23.60	15.36
Hepatitis -	-	1	-	-	1	1	1	-	2	1	-	-	7	.04	14.28
Scruvy Disease -	12	2	6	5	4	7	5	2	1	2	2	2	50	.32	20.00
Respiratory Diseases -	19	21	14	14	13	14	16	17	16	41	23	33	241	1.56	12.45
Phtisias Pulmonalis -	4	3	6	5	6	11	4	3	1	3	1	1	48	.31	56.25
Dropsy -	3	1	1	-	1	3	1	1	-	-	1	3	15	.10	26.67
Atrophy and Anæmia -	43	19	6	5	11	8	5	7	4	2	4	2	116	.75	16.38
Scruvy -	1	-	-	-	-	2	2	2	4	2	1	2	16	.10	12.50
umatism -	22	19	28	27	12	32	21	32	17	20	19	27	276	1.79	1.62
Cerebral Diseases -	34	15	27	20	19	22	34	26	21	25	15	18	276	1.79	
Cess and Ulcer -	9	20	14	41	65	75	70	50	25	35	34	6	444	2.59	
Wounds and Accidents -	135	174	211	174	193	180	245	200	163	146	116	119	2,056	13.31	
Other Causes -	27	38	55	61	70	63	55	75	29	43	43	32	591	3.82	1.62
	152	189	204	182	156	142	116	148	115	96	79	80	1,659	10.74	
	1,020	1,030	1,238	1,428	1,274	1,310	1,188	1,564	1,265	1,250	968	836	14,371		
Admitted per Cent. of Average Strength in each Month.															
	6.81	6.82	8.14	9.17	8.16	8.42	7.57	10.04	8.22	8.05	6.18	5.38	93.02		

3.—GAOLS OF THE BENGAL PRESIDENCY, 1864 - *continued.*

TABLE showing the SICKNESS and MORTALITY among the GAOL POPULATION in Nagpore and Central India during the Year 1864, and the Prevalence of the Principal Diseases in each Month of the Year.

MONTHS.	Average Strength.	Average Number Daily Sick.	Number Daily Sick per Cent. of Strength.	Number of Deaths.	Died per 1,000 of Average Strength.	CAUSES OF DEATHS IN HOSPITAL.																		
						Cholera.	Small-pox.	Fever, Intermittent.	Fever, Remittent.	Fever, Continued.	Apoplexy.	Dysentery.	Diarrhœa.	Hepatitis.	Spleen Disease.	Respiratory Diseases.	Heart Diseases.	Phthisis Pulmonalis.	Dropsy.	Scurvy.	Atrophy and Anæmia.	Wounds and Accidents.	All other Cause.	
January	5,386	261	4.85	54	-	-	-	9	20	-	-	6	11	-	-	2	-	-	-	1	-	-	-	3
February	5,342	229	4.29	17	-	-	1	2	5	-	-	2	5	-	-	-	-	-	-	-	-	-	-	1
March	5,420	228	4.21	17	-	7	-	3	-	-	-	-	1	-	1	3	-	-	-	-	1	-	-	1
April	5,444	233	4.28	19	-	7	-	-	3	-	-	5	1	-	-	1	-	-	-	-	-	-	-	1
May	5,501	203	3.69	14	-	5	-	2	-	-	-	4	-	-	-	-	-	-	-	-	-	-	2	2
June	5,479	217	3.96	34	-	27	-	-	1	-	-	3	2	-	-	-	-	-	-	-	-	-	-	-
July	5,431	231	4.25	23	-	8	-	-	1	-	-	2	5	-	-	2	-	1	-	-	-	-	-	2
August	5,536	246	4.44	20	-	6	-	1	2	-	-	4	4	-	-	1	-	-	-	-	-	-	-	2
September	5,461	299	5.48	19	-	1	-	-	1	-	-	7	8	-	-	-	-	1	-	-	1	-	-	-
October	5,550	370	6.67	18	-	2	-	1	2	-	-	3	5	-	-	4	-	-	-	-	-	-	-	1
November	5,503	316	5.74	28	-	-	-	2	-	-	-	8	11	-	-	3	-	-	-	-	2	-	-	2
December	5,331	279	5.23	17	-	-	-	1	1	-	-	3	8	-	-	2	-	-	-	-	2	-	-	-
						63	1	21	36	-	-	49	61	-	1	18	-	2	-	1	11	1	15	
						Died per 1,000 of Average Strength.																		
For the Year	5,448	259	4.75	280	51.39	11.56	.18	3.85	6.61	-	-	9.00	11.20	-	.18	3.21	-	.36	-	.18	2.02	.18	2.76	

Deaths out of Hospital, 2. Died per 1,000 of Average Strength, .37.

DISEASES.	NUMBER OF ADMISSIONS INTO HOSPITAL IN EACH MONTH.												Total Admissions during the Year.	Admitted per Cent. of Average Strength.	Died per Cent. of Admissions.
	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.			
Cholera	-	-	25	15	18	50	18	23	3	3	-	-	155	2.85	40.64
Small-pox	-	1	-	-	-	3	1	-	-	2	-	2	9	.17	11.11
Fever, Intermittent	159	144	135	195	155	166	177	231	337	482	311	217	2,709	49.72	.77
" Remittent	58	11	9	9	8	17	10	13	15	22	5	13	190	3.49	18.95
" Continued	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Apoplexy	1	1	-	-	-	-	-	-	-	-	-	-	2	.04	-
Delirium Tremens	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dysentery and Diarrhœa	54	37	60	70	62	78	103	125	127	94	104	65	979	17.97	11.24
Hepatitis	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Spleen Disease	3	3	2	2	1	1	-	1	3	3	2	2	23	.42	4.35
Respiratory Diseases	20	20	14	21	19	21	9	13	8	17	10	18	190	3.49	9.47
Phthisis Pulmonalis	1	-	-	-	1	1	-	1	1	1	-	-	6	.11	33.33
Dropsy	-	-	-	-	-	-	3	1	-	1	1	-	6	.11	-
Atrophy and Anæmia	3	5	2	4	4	1	2	4	2	9	5	7	48	.88	22.92
Scurvy	-	-	-	-	1	1	3	-	-	2	3	-	10	.18	10.00
Rheumatism	18	19	15	17	11	8	8	8	18	12	16	10	160	2.94	-
Venerical Diseases	10	12	13	11	12	9	9	8	14	7	10	7	128	2.34	-
Eye Diseases	3	6	9	9	12	5	12	6	9	10	8	3	92	1.69	-
Abscess and Ulcer	91	94	109	87	86	91	120	121	152	144	97	96	1,288	23.64	.56
Wounds and Accidents	11	23	10	14	26	25	13	17	12	22	16	12	201	3.69	-
All other Causes	98	79	98	87	84	76	73	78	64	81	80	77	975	17.90	-
	536	455	501	541	500	553	561	650	765	912	668	529	7,171		
Admitted per Cent. of Average Strength in each Month.															
	9.96	8.52	9.25	9.94	9.09	10.09	10.33	11.74	14.01	16.43	12.14	9.92	181.63		

3.—GAOLS OF THE BENGAL PRESIDENCY, 1864—continued.

TABLE showing the SICKNESS and MORTALITY among the GAOL POPULATION in the *Agra, Meerut, and Rohilkund* Districts during the Year 1864, and the Prevalence of the Principal Diseases in each Month of the Year.

MONTHS.	Average Strength.	Average Number Daily Sick.	Number Daily Sick per Cent. of Strength.	Number of Deaths.	Died per 1,000 of Average Strength.	CAUSES OF DEATHS IN HOSPITAL.																	
						Cholera.	Small-pox.	Fever, Intermittent.	Fever, Remittent.	Fever, Continued.	Apoplexy.	Dysentery.	Diarrhoea.	Hepatitis.	Spleen Disease.	Respiratory Diseases.	Heart Diseases.	Phtisis Pulmonalis.	Dropsy.	Scurvy.	Atrophy and Anæmia.	Wounds and Accidents.	All other Causes.
January -	7,573	181	2.39	36	-	-	-	-	8	9	-	-	6	-	-	6	-	1	-	-	2	-	4
February -	7,550	246	3.26	64	-	-	-	-	14	32	-	-	4	-	-	1	-	-	-	-	4	-	9
March -	7,628	424	5.56	91	-	-	-	3	23	52	-	3	2	-	-	2	-	-	-	-	1	-	5
April -	7,121	598	8.40	153	-	-	-	-	38	102	1	4	1	-	-	-	-	1	-	-	1	2	3
May -	7,479	325	4.35	58	-	-	-	-	16	31	-	3	1	-	-	3	-	-	-	1	1	-	2
June -	7,279	214	2.91	51	-	-	-	2	14	21	2	3	5	1	-	1	-	-	-	-	1	-	4
July -	7,681	173	2.25	15	-	-	-	2	4	1	-	1	1	-	-	1	-	-	-	-	1	-	4
August -	7,878	179	2.27	28	-	-	-	1	-	3	-	6	-	-	-	2	-	-	1	1	7	-	7
September -	7,867	220	2.79	15	-	-	-	-	-	3	-	4	2	-	-	-	-	1	-	-	1	3	1
October -	7,901	189	2.39	25	-	-	-	-	2	-	-	5	4	-	-	2	-	-	-	-	4	-	8
November -	7,854	153	1.94	16	-	-	-	-	3	1	-	2	4	-	-	2	1	-	-	-	-	-	3
December -	7,838	165	2.11	9	-	-	-	-	2	-	-	1	3	-	-	-	-	-	-	-	1	-	2
						-	-	8	124	255	3	32	33	1	-	20	1	3	2	1	24	5	52
Died per 1,000 of Average Strength.																							
for the Year -	7,641	257	3.36	564	73.81	-	-	1.05	16.23	33.37	.39	4.19	4.32	.13	-	2.62	.13	.39	.26	.13	3.14	.66	6.80

Deaths out of Hospital, 7. Died per 1,000 of Average Strength, .92.

DISEASES.	NUMBER OF ADMISSIONS INTO HOSPITAL IN EACH MONTH.												Total Admissions during the Year.	Admitted per Cent. of Average Strength.	Died per Cent. of Admissions.
	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.			
Cholera - - - -	-	-	-	-	-	-	-	1	-	-	-	-	1	.01	-
Small-pox - - -	-	1	5	-	-	-	-	-	-	1	-	-	7	.09	-
Fever, Intermittent - -	128	96	58	95	136	152	148	181	227	185	143	97	1,646	21.54	.49
" Remittent - - -	130	303	660	560	243	85	62	53	76	28	37	32	2,269	29.69	16.70
" Continued - - -															
Apoplexy - - - -	-	-	1	1	-	3	-	-	-	-	-	-	5	.07	60.00
Melirium Tremens - -	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dysentery and Diarrhoea -	48	21	36	46	57	72	56	84	108	79	35	42	684	8.95	9.51
Hepatitis - - - -	-	-	-	-	-	1	1	2	1	-	-	-	5	.07	20.00
Spleen Disease - - -	-	1	-	-	1	-	-	1	-	1	1	-	5	.07	-
Respiratory Diseases - -	16	19	18	2	13	15	9	14	5	10	20	19	160	2.10	12.50
Phtisis Pulmonalis - -	1	2	1	1	-	-	-	1	-	-	1	1	8	.10	37.50
Dropsy - - - - -	-	1	-	2	-	1	1	-	-	-	1	-	6	.08	33.33
Atrophy and Anæmia - -	8	8	3	3	5	6	8	9	6	8	2	-	66	.86	36.36
Scurvy - - - - -	-	-	-	-	-	-	1	2	-	-	-	-	3	.04	33.32
Pneumatism - - - -	9	12	12	11	12	11	12	11	11	11	12	13	137	1.79	-
General Diseases - - -	13	9	12	12	10	13	16	13	16	9	16	13	152	1.99	-
Eye Diseases - - - -	8	6	4	9	14	14	19	11	10	14	11	7	127	1.66	-
Wounds and Ulcer - - -	105	94	73	69	95	85	158	106	89	65	64	56	1,059	13.86	2.28
Wounds and Accidents -	25	19	35	24	14	28	46	30	42	24	25	22	334	4.37	-
All other Causes - - -	57	65	79	61	66	63	75	66	56	41	42	61	732	9.58	-
	548	657	997	896	666	549	612	585	647	476	410	363	7,406		
Admitted per Cent. of Average Strength in each Month.															
	7.24	8.70	13.07	12.58	8.91	7.54	7.97	7.43	8.22	6.02	5.20	4.63		96.92	

3.—GAOLS OF THE BENGAL PRESIDENCY, 1864—continued.

TABLE showing the SICKNESS and MORTALITY among the GAOL POPULATION in the Punjab during the Year 1864, and the Prevalence of the Principal Diseases in each Month of the Year.

MONTHS.	Average Strength.	Average Number Daily Sick.	Number Daily Sick per Cent. of Strength.	Number of Deaths.	Died per 1,000 of Average Strength.	CAUSES OF DEATHS IN HOSPITAL.															
						Cholera.	Small-pox.	Fever.*	Apoplexy.	Dysentery.	Diarrhoea.	Hepatitis.	Spleen Disease.	Respiratory Diseases.	Heart Diseases.	Phthisis Pulmonalis.	Dropsy.	Scurvy.	Atrophy and Anæmia.	Wounds and Accidents.	All other Causes.
January -	9,493	655	6·90	101	-	-	-	62	1	7	7	-	-	3	1	-	-	-	12	1	7
February -	9,475	599	6·32	116	-	-	-	80	1	10	4	-	2	3	-	-	1	2	9	-	4
March -	9,117	541	5·93	109	-	-	-	74	-	14	4	-	-	5	1	-	-	-	1	1	10
April -	9,130	475	5·20	48	-	1	-	32	-	3	5	-	-	4	-	-	-	-	1	1	1
May -	9,148	383	4·19	47	-	-	-	34	-	3	5	-	-	-	-	-	-	-	1	1	3
June -	9,451	338	3·58	31	-	-	-	14	3	2	3	-	-	1	-	-	-	-	2	2	4
July -	9,626	253	2·63	23	-	-	-	6	1	2	2	-	-	3	-	3	-	-	1	-	5
August -	9,735	261	2·68	16	-	-	-	10	-	1	1	-	-	-	-	3	-	-	1	-	-
September -	10,172	370	3·61	77	-	-	-	48	-	-	11	-	-	3	-	-	-	-	7	2	6
October -	10,063	512	5·09	76	-	-	-	51	-	2	13	-	1	3	1	1	-	-	3	-	1
November -	10,095	367	3·64	77	-	-	-	47	1	4	13	-	-	4	-	1	-	-	3	1	3
December -	10,020	329	3·28	100	-	-	-	60	2	9	14	1	-	5	-	-	-	-	5	-	4
						1	-	518	9	57	82	1	3	34	3	8	1	2	46	8	48
Died per 1,000 of Average Strength.																					
For the Year -	9,630	424	4·40	821	85·25	10	-	53·80	·94	5·92	8·52	10	31	3·53	31	83	10	20	4·78	83	4·98

Deaths out of Hospital, 5. Died per 1,000 of Average Strength, 52.

DISEASES.	NUMBER OF ADMISSIONS INTO HOSPITAL IN EACH MONTH.												Total Admissions during the Year.	Admitted per Cent. of Average Strength.	Died per Cent. of Admissions.
	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.			
Cholera -	-	-	-	1	-	-	-	-	-	-	-	-	1	·01	-
Small-pox -	-	-	1	-	-	-	-	-	-	-	2	3	6	·06	-
Fevers -	763	798	727	477	464	353	262	435	774	982	662	581	7,278	75·58	7·12
Apoplexy -	2	2	-	-	-	3	2	-	-	-	1	2	12	·12	75·00
Delirium Tremens -	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dysentery and Diarrhoea -	94	102	70	88	81	66	92	93	112	121	139	87	1,145	11·89	12·14
Hepatitis -	2	2	1	2	1	-	3	2	-	1	6	1	21	·22	4·76
Spleen Disease -	2	11	2	2	3	6	1	2	4	5	10	8	56	·58	5·36
Respiratory Diseases -	33	35	21	25	19	21	7	5	22	18	13	32	251	2·61	13·64
Phthisis Pulmonalis -	1	-	-	1	-	-	4	4	2	1	-	1	14	·15	67·14
Dropsy -	3	-	3	-	-	1	-	-	-	-	1	-	8	·08	12·50
Atrophy and Anæmia -	21	17	10	11	10	8	4	5	15	10	16	8	135	1·40	34·07
Scurvy -	3	1	5	9	21	4	9	2	5	12	4	5	80	·83	2·50
Rheumatism -	16	13	8	7	13	14	20	17	27	12	18	16	181	1·88	-
Veneral Diseases -	10	10	18	11	21	18	9	16	12	16	11	19	171	1·77	-
Eye Diseases -	8	3	4	21	22	23	15	23	18	28	19	7	191	1·98	-
Abscess and Ulcer -	105	98	76	86	92	106	106	100	79	84	59	68	1,065	11·06	1·95
Wounds and Accidents -	12	15	31	22	19	20	24	16	26	10	15	14	227	2·36	-
All other Causes -	100	91	74	73	103	95	110	120	118	110	77	62	1,133	11·77	-
	1,175	1,198	1,054	836	869	738	668	846	1,214	1,410	1,053	914	11,975		
Admitted per Cent. of Average Strength in each Month.															
	12·38	12·64	11·55	9·16	9·50	7·81	6·94	8·78	11·91	14·64	10·94	9·49	124·35		

* The Deaths returned under the headings "Intermittent and Remittent Fever," were in reality, almost without exception, caused by Gaol Typhus. It has been found impossible to separate even this disease from the general class of fevers, and the ratio must, therefore, simply be regarded as influenced by the prevalence of Gaol Fever, and not as significant of a death-rate applicable either to one variety of fever or another.

COMPARATIVE STATEMENT of the Ratios of Sickness and Mortality among the Gaol Population in the various Provinces of the Bengal Presidency, for the Year 1864.

DISEASES.	BENGAL PROPER, AND ASSAM.			DINAPORE, BENARES, OUDH, AND CANNONPORE DISTRICTS.			NAGPORE AND CENTRAL INDIA.			AGRA, MEERUT, AND ROHILKUND DISTRICTS.			PUNJAB.			BENGAL PRESIDENCY.		
	Strength.	Died per Cent.	of Average Strength per 1,000.	Strength.	Died per Cent.	of Average Strength per 1,000.	Strength.	Died per Cent.	of Average Strength per 1,000.	Strength.	Died per Cent.	of Average Strength per 1,000.	Strength.	Died per Cent.	of Average Strength per 1,000.	Strength.	Died per Cent.	of Average Strength per 1,000.
Cholera	454	38.17	17.31	2.55	34.52	8.80	2.85	40.64	11.56	.01	-	-	.01	-	.10	2.29	37.31	8.56
Small-pox	3.60	1.15	.42	.21	9.09	.19	.17	11.11	.18	.09	-	-	.06	-	-	1.09	1.74	.19
Fever	58.66	.64	3.75	29.04	3.23	9.52	53.21	1.97	10.46	51.23	9.88	50.65	75.58	7.12	53.80	51.43	4.30	22.11
Dysentery and Diarrhoea	36.01	7.50	27.01	23.60	15.36	36.24	17.97	11.24	20.20	8.95	9.51	8.51	11.89	12.14	14.44	22.16	10.85	24.03
Hepatitis	.28	17.07	.48	.04	14.28	.07	-	-	-	.07	20.00	.13	.22	4.76	.10	.14	13.51	.19
Spleen Disease	1.32	3.66	.48	.32	20.00	.65	.42	4.35	.18	.07	-	-	.58	5.36	.31	.62	6.46	.40
Ophthalmia	1.56	-	-	2.89	-	-	1.69	-	-	1.66	-	-	1.98	-	-	2.05	-	-
Rheumatism	5.01	-	-	1.79	-	-	2.94	-	-	1.79	-	-	1.88	-	-	2.81	-	-
Scurvy	.34	-	-	.10	12.50	.13	.18	10.00	.18	.04	33.33	.13	.83	2.50	.20	.30	3.80	.11
Dropsy	1.07	29.22	3.12	.10	26.67	.26	.11	-	-	.08	33.33	.26	.08	12.50	.10	.36	27.51	.99
Atrophy and Anæmia	1.36	20.81	2.84	.75	16.38	1.23	.88	22.92	2.02	.86	36.36	3.14	1.40	34.07	4.78	1.07	25.10	2.68
Phthisis Pulmonalis	.53	65.79	3.46	.31	56.25	1.75	.11	33.33	.36	.10	37.50	.39	.15	57.14	.83	.29	59.21	1.71
Apoplexy	.07	90.00	.62	.10	75.00	.78	.04	-	-	.07	60.00	.39	.12	75.00	.94	.09	73.33	.63
Respiratory Diseases	5.26	6.18	3.25	1.56	12.45	1.94	3.49	9.47	3.31	2.10	12.50	2.62	2.61	13.54	3.53	3.05	9.30	2.83
Veneral Diseases	2.59	-	-	1.79	-	-	2.34	-	-	1.99	-	-	1.77	-	-	2.09	-	-
Abscess and Ulcer	13.28	-	-	13.31	-	-	23.64	-	-	13.86	-	-	11.06	-	-	14.04	-	-
Injury	4.19	-	.42	3.82	-	.32	3.69	-	.18	4.37	-	.66	2.36	-	.83	3.72	-	.48
All other Causes	23.95	-	3.25	10.74	-	5.24	17.90	-	2.76	9.58	-	6.93	11.77	-	5.29	15.13	-	4.69
Died out of Hospital	-	-	.69	-	-	.45	-	-	.37	-	-	.92	-	-	.52	-	-	.59
	163.62	-	67.10	93.02	-	67.37	131.63	-	51.76	96.92	-	74.73	124.35	-	85.77	122.73	-	70.19

* Gaol Fever in the Rangoon, Cawnpore, Futehghur, Agra, Delhi, Umballa, Unrisur, Lahore, Goojanwalla, Mooltan, and Rawul Pindie Gaols. The casualties from this disease may be estimated at nearly 1,200, or a third of the total mortality of the year, if the deaths from sequelae of the fever be taken into account.

3.—GAOLS OF THE BENGAL PRESIDENCY, 1864—continued.

TABLE showing the general Statistics of SICKNESS and MORTALITY in the GAOLS of the Bengal Presidency, and the Average Number Daily Sick per Cent. of Strength in each Month.

STATIONS.	Average Strength for the Year.	DAILY SICK PER CENT. OF AVERAGE STRENGTH IN EACH MONTH.												Daily Sick per Cent. of Average Strength for the Year.	Admitted per Cent. of Average Strength.	DIED PER 1,000 OF AVERAGE STRENGTH.		
		January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.			A. Cholera.	B. Sudden Deaths out of Hospital.	C. All Causes.
Ahore -	1,793	5.20	4.32	4.71	4.35	4.09	4.27	5.34	6.11	5.27	5.46	6.12	4.67	4.96	172.11	9.48	-	63.02
Baraset -	139	6.02	7.10	7.05	5.33	5.29	3.39	3.66	6.02	9.73	12.36	10.84	10.53	6.47	217.99	-	-	64.75
Jessore -	489	5.35	6.03	6.75	9.20	5.26	4.86	4.09	2.54	1.89	2.99	4.45	4.18	4.91	154.39	44.99	2.04	75.66
Kishnagur -	363	2.59	3.11	2.60	4.18	3.74	2.60	2.94	3.17	3.36	4.14	4.08	4.14	3.34	78.79	8.26	-	38.57
Moorsheadabad -	186	9.57	10.41	9.19	10.31	7.38	6.86	6.37	5.08	6.03	6.17	6.02	6.63	7.51	132.80	-	5.38	91.40
Howrah -	127	6.69	5.10	6.41	4.42	4.57	2.36	5.86	5.36	4.89	4.49	5.00	5.50	5.12	81.10	7.87	-	47.24
Hooghly -	451	5.20	5.92	4.97	5.72	5.57	5.71	5.02	6.89	6.74	6.27	5.85	4.80	5.72	237.47	15.52	-	77.01
Burdwan -	411	5.34	4.84	7.29	7.20	6.26	6.37	6.78	6.89	5.95	5.05	4.88	4.07	5.80	189.54	9.73	2.43	55.96
Bancoorah -	395	2.98	11.12	7.23	1.96	.93	1.75	1.33	1.41	1.73	1.64	1.40	1.04	2.78	113.92	40.51	-	68.35
Purulea -	183	2.88	4.12	5.95	3.48	2.90	3.46	3.84	2.92	2.29	2.90	2.14	.93	3.15	105.46	-	-	38.25
Sooree -	285	3.02	2.98	3.20	4.04	4.49	4.13	4.35	3.31	3.21	3.88	3.70	2.17	3.52	98.59	-	3.51	28.07
Deogurh -	89	4.41	1.95	2.62	4.76	2.30	3.19	4.69	5.72	3.33	13.04	6.38	7.41	3.93	115.73	-	-	11.24
Rajmehal -	160	4.05	3.90	3.69	5.81	7.38	4.61	4.11	2.85	2.78	3.18	2.57	2.59	3.99	167.45	82.84	-	94.67
Malda -	72	2.73	4.66	4.83	4.22	4.04	5.61	2.26	6.29	11.18	13.97	7.73	7.00	6.14	133.33	-	-	13.89
Dinapore -	462	8.56	9.58	6.10	6.51	5.38	3.25	3.18	1.17	4.03	4.04	4.87	4.73	5.37	157.36	80.09	-	168.83
Rampore Bauleah -	394	6.27	3.97	9.70	6.46	4.83	3.53	3.35	3.83	3.96	3.25	4.30	2.89	4.08	127.92	45.69	-	81.22
Rungpore -	323	6.60	6.20	6.05	6.82	5.90	5.08	4.15	4.73	5.92	4.98	7.32	7.81	5.98	169.04	3.10	-	86.69
Bograh -	171	2.87	3.28	3.92	4.46	5.00	3.53	4.17	4.59	6.69	5.53	5.49	7.65	4.63	167.84	5.85	-	71.54
Mymensingh -	474	3.64	3.24	3.87	3.35	2.76	2.83	3.31	4.02	3.68	3.44	3.61	4.81	3.53	143.04	-	-	69.62
Pubna -	141	9.06	2.82	3.84	5.86	3.69	3.33	3.91	4.45	3.53	4.72	5.87	6.77	4.71	319.15	70.92	-	106.28
Furzedpore -	410	7.87	5.80	7.70	8.15	5.34	5.37	4.20	1.99	4.32	6.65	6.50	6.70	5.99	196.34	2.44	2.44	34.15
Backergunge -	495	6.47	6.35	6.02	5.26	4.06	7.97	8.15	7.07	4.62	4.15	5.82	5.70	5.95	96.57	34.34	-	195.96
Noacolly -	224	7.35	5.58	7.29	7.06	5.75	4.89	6.77	7.20	6.63	5.89	5.39	5.55	6.29	311.16	8.93	-	31.25
Chittagong -	327	3.27	2.45	3.65	4.45	3.56	4.02	2.99	2.21	3.38	4.55	3.71	2.54	3.40	84.71	-	-	21.41
Tipperah -	398	2.17	2.60	1.86	2.53	2.20	1.65	2.11	1.95	1.50	1.94	2.23	2.07	2.07	90.95	2.51	2.51	25.12
Dacca -	463	11.08	11.66	12.37	11.12	10.10	10.59	8.31	9.36	9.06	12.10	9.69	8.68	10.30	188.99	2.16	-	30.24
Sylhet -	359	4.36	6.27	3.50	3.33	3.78	5.61	4.20	3.39	3.48	5.84	5.26	4.99	4.52	181.62	-	-	19.50
Cherrapunjee -	17	8.79	.72	7.00	7.86	4.91	4.77	3.85	1.46	.84	2.57	2.31	1.50	3.76	129.41	-	-	99.53
Cachar -	211	4.37	4.12	2.63	3.55	6.06	5.79	5.95	6.75	9.39	9.37	9.62	9.41	6.81	203.32	33.18	-	80.54
Gowalparah -	149	14.54	14.89	13.87	11.56	11.58	13.71	15.78	14.43	12.28	2.89	4.33	3.18	11.40	289.92	13.42	-	17.90
Gowhaty -	153	6.87	7.50	9.26	9.55	11.25	8.81	7.67	7.72	8.67	5.15	4.51	2.04	7.56	183.01	13.07	-	73.17
Seebshattur -	123	.80	1.16	1.19	1.66	2.36	4.29	3.86	2.89	3.89	1.46	2.83	2.79	2.34	148.78	-	-	32.61
Nowgong -	92	7.98	4.61	5.56	4.04	6.70	4.23	8.36	6.13	5.89	2.48	1.19	.79	5.05	208.70	-	-	35.35
Tezpur -	198	2.19	1.60	2.58	2.45	6.22	8.60	5.47	4.67	4.31	5.77	6.70	4.69	4.63	143.94	-	-	104.00
Debrooghur -	125	1.01	1.17	2.45	1.98	2.14	3.71	5.91	4.81	4.53	5.15	4.43	2.05	3.29	130.40	-	-	27.57
Midnapore -	544	3.94	3.64	4.95	5.38	4.13	8.30	3.72	4.19	4.37	5.01	4.58	3.84	4.21	147.98	7.35	3.67	33.33
Balasore -	210	5.49	5.04	5.67	5.72	5.80	4.49	5.72	6.23	5.14	8.31	4.93	3.10	5.45	181.90	-	4.76	76.49
Cuttack -	353	4.27	5.31	5.47	3.19	3.28	3.42	3.74	3.91	3.46	2.96	3.23	3.25	3.81	162.89	8.50	-	-
Pooree -	32	8.75	8.82	5.56	14.44	4.00	7.18	5.22	8.00	11.54	5.48	8.70	4.90	6.94	237.50	-	-	331.43
Sumbulpore -	175	10.75	22.63	16.27	16.47	10.58	17.34	16.55	17.31	15.15	12.52	10.58	11.03	14.93	374.86	262.86	-	51.16
Cheybassa -	215	4.00	2.36	3.54	2.93	3.03	2.26	1.22	3.03	2.87	3.56	3.84	4.60	3.06	119.53	-	-	27.59
Ranchhee -	290	1.76	1.68	4.01	3.91	2.25	2.22	3.41	3.12	5.91	4.15	3.25	3.04	3.26	103.79	-	-	29.61
Hazareebaugh -	439	5.46	3.18	4.25	4.08	5.75	7.35	8.08	3.38	3.80	.72	4.15	11.93	5.29	123.97	-	-	44.20
Monghyr -	362	8.51	8.70	7.82	7.17	5.80	5.87	5.70	5.94	7.64	10.33	9.21	7.85	7.51	219.34	-	-	61.28
Bhaugulpore -	359	4.10	3.32	5.26	5.82	6.34	6.21	5.16	3.87	5.85	6.05	4.38	3.96	5.08	206.13	27.85	-	90.04
Purneah -	522	4.13	7.49	6.87	7.49	5.51	5.59	5.82	5.02	4.29	4.08	4.18	4.00	5.32	181.04	-	-	98.04
Darjeeling -	51	5.95	6.45	4.46	3.24	5.57	4.86	3.92	3.69	4.53	2.56	.83	4.64	4.06	129.41	39.22	-	29.50
Gyah -	339	3.72	3.60	5.33	5.47	4.46	4.61	5.66	5.92	4.29	5.54	3.61	2.90	4.45	92.33	2.95	2.95	78.68
Patna -	467	1.83	1.26	2.30	3.72	3.30	4.11	5.44	7.87	7.68	8.68	6.56	4.39	4.82	134.05	17.13	2.14	72.80
Deegah -	79	4.65	2.41	2.47	3.94	5.19	5.71	7.94	7.14	6.25	3.70	3.92	1.36	4.11	136.71	-	-	63.29
Araah -	499	.93	.21	1.04	1.00	.81	.71	1.01	1.18	2.22	1.21	.89	.44	1.01	30.46	6.01	-	62.12
Chumparun -	203	5.69	3.23	3.00	3.15	4.28	5.05	3.68	5.56	3.78	2.86	2.24	1.63	3.69	111.82	14.78	-	68.97
Mozufferpore -	433	15.11	10.78	7.38	10.05	10.22	7.58	4.83	5.47	5.81	5.44	5.27	4.52	7.64	248.50	2.31	-	55.43
Chuprah -	440	2.90	3.24	3.10	3.33	4.36	3.38	3.81	5.03	4.45	3.76	3.76	3.21	3.70	79.01	2.27	2.27	72.72
Ghazeeপুর -	662	1.54	1.79	2.41	1.01	.81	.35	.14	.51	.45	.69	.45	.47	.89	18.88	4.53	-	13.60
Benares -	1,306	2.41	2.48	3.03	3.01	3.07	3.40	2.83	4.82	3.88	2.58	1.88	2.13	2.95	54.52	19.91	-	98.10
Mirzapore -	351	2.07	1.72	1.23	1.99	2.07	1.30	1.13	3.22	3.65	4.13	3.93	2.71	2.42	51.85	2.85	-	48.43
Azimghur -	358	.90	1.87	1.64	1.27	1.66	1.49	1.53	1.49	1.79	2.15	1.80	1.98	1.64	55.31	2.79	-	8.35
Juanpore -	269	2.9																

3.—GAOLS OF THE BENGAL PRESIDENCY, 1864—continued.

TABLE showing the general Statistics of Sickness and Mortality in the Gaols of the Bengal Presidency, &c.—continued.

STATIONS.	Average Strength for the Year.	DAILY SICK PER CENT OF AVERAGE STRENGTH IN EACH MONTH.												Daily Sick per Cent. of Average Strength for the Year.	Admitted per Cent. of Average Strength.	DIED PER 1,000 OF AVERAGE STRENGTH.		
		January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.			A. Cholera.	B. Sudden Deaths out of Hospital.	C. All Causes.
Chanda -	170	6.73	4.58	4.36	4.14	3.05	3.92	5.05	4.05	4.79	4.82	3.70	4.62	4.47	131.77	29.41	-	70.59
Kowtah -	68	8.20	1.50	7.27	4.88	3.82	.29	2.24	5.67	22.94	14.09	11.59	7.13	7.00	183.82	-	-	14.71
Nagpore -	559	9.67	7.00	6.48	5.91	5.18	5.77	5.50	7.83	7.99	10.76	8.90	6.84	7.11	137.75	16.10	-	57.25
Chindwara -	100	4.18	2.39	4.32	2.15	1.07	1.30	1.55	.70	2.91	5.84	4.24	2.22	2.56	112.00	-	-	70.00
Sironcha -	36	5.43	6.91	8.64	6.16	1.46	8.33	12.18	6.94	4.86	9.50	5.13	2.37	6.33	176.66	-	-	-
Mundla -	59	10.17	12.00	7.89	8.05	5.97	9.09	8.80	6.41	7.55	11.80	7.84	5.56	8.31	332.20	-	-	67.80
Tubbulpore (Civil).	471	5.22	6.14	6.39	5.38	4.73	5.37	5.06	5.89	6.34	7.05	7.05	6.30	5.90	124.20	-	-	27.68
Dumoh -	207	1.49	2.87	3.21	3.18	3.41	3.74	4.96	4.07	5.09	14.13	7.14	5.67	4.85	162.79	-	-	19.32
Rangor -	348	8.59	9.72	7.08	7.03	6.68	5.77	6.35	10.72	9.86	9.01	6.77	7.78	7.94	264.66	45.98	-	60.09
Nursingpore -	192	1.68	1.25	3.03	5.21	2.66	3.37	5.00	4.89	4.47	6.44	6.39	4.59	4.03	161.98	-	-	10.42
Lullulpore -	259	2.92	1.24	1.75	2.73	2.07	2.19	1.15	1.84	2.84	6.03	6.36	5.05	3.17	91.89	-	3.86	19.30
Thansi -	298	3.20	3.04	3.52	4.25	2.40	3.03	3.46	3.92	5.01	5.86	7.14	5.29	4.28	184.90	-	-	10.07
Seonee -	268	3.14	3.89	2.65	2.65	2.19	3.38	3.56	2.74	2.92	4.66	3.06	3.28	3.19	75.00	22.39	-	89.55
Baitool -	163	3.56	3.51	4.48	2.92	3.03	3.99	6.83	5.95	6.82	7.26	5.22	3.55	4.57	144.78	-	-	12.27
Schore -	95	3.59	6.19	6.70	7.07	6.40	8.54	5.81	6.05	6.49	7.86	6.25	6.19	6.45	264.21	-	-	21.05
Ioshungabad -	272	2.94	4.42	5.12	7.02	7.60	6.04	6.25	7.14	8.11	9.77	7.04	9.07	6.63	131.99	-	-	22.06
Mundlaisir -	148	5.77	6.38	5.78	6.32	6.43	6.83	11.20	4.60	8.96	5.40	5.56	18.52	6.63	167.57	6.76	-	33.78
Janjere -	229	6.15	6.91	6.05	5.47	5.41	5.22	5.30	3.33	5.51	7.98	7.03	7.51	6.04	165.94	-	-	61.14
Seaur -	103	5.83	5.56	5.08	7.45	3.70	3.12	5.62	10.00	8.18	6.67	6.82	4.59	6.12	171.84	-	-	39.42
Muttra -	243	2.09	1.59	1.98	4.52	4.03	3.31	2.26	3.01	4.98	4.00	3.48	3.44	3.30	176.13	-	-	32.92
Agra -	1,993	3.35	6.13	12.32	22.08	7.50	3.89	2.80	2.89	2.69	1.88	1.93	2.39	5.57	113.60	-	1.00	179.63
Secundra -	257	7.59	9.64	14.57	28.50	15.17	7.67	3.29	3.97	13.67	4.34	1.99	2.33	11.41	315.56	-	-	295.72
Etawah -	183	1.30	1.36	.83	1.74	2.60	1.75	1.27	1.64	1.70	.75	1.43	2.20	1.54	146.99	-	-	5.46
Mynpoorie -	240	4.98	3.99	4.46	3.70	4.02	3.88	2.67	3.44	5.04	5.00	2.14	3.59	3.88	124.17	-	4.17	8.34
Allyghur -	165	2.04	2.18	3.43	4.73	4.90	3.52	2.36	2.17	2.77	3.50	2.85	3.16	3.12	127.88	-	6.06	36.86
Bolundshuhur -	141	2.63	2.27	4.26	6.13	7.02	3.00	3.38	3.88	4.03	4.31	4.60	3.87	4.06	125.53	-	-	14.18
Shaljehanpore -	258	4.10	4.59	4.90	3.69	5.98	5.50	5.14	7.29	7.02	6.94	2.81	2.86	5.00	129.54	-	-	23.26
Bareilly -	1,449	.71	.65	.83	.98	.78	.71	.62	.63	.65	.51	.57	.64	.68	27.95	-	-	13.11
Budaon -	212	5.58	3.81	6.13	8.09	5.30	6.10	3.17	.50	6.88	6.13	6.53	5.96	5.45	120.76	-	-	28.30
Seharanpore -	204	2.03	2.32	1.26	1.25	1.21	1.26	1.26	1.44	2.13	1.23	1.21	2.25	1.57	46.08	-	-	14.61
Bijnore -	230	1.59	2.51	2.54	2.88	2.90	3.54	3.04	2.71	2.76	1.43	.93	.69	2.26	160.00	-	-	13.04
Dehray -	67	3.07	3.95	4.74	3.97	5.71	5.65	5.00	2.79	2.88	2.71	4.91	7.67	4.34	170.15	-	-	59.70
Almorah -	130	4.50	4.83	9.04	10.59	9.27	9.48	12.58	8.40	9.66	8.22	8.33	6.75	8.55	290.00	-	-	7.60
Mozuffernuggur -	97	.68	.33	1.11	.25	.94	2.25	1.02	1.74	.38	1.65	1.35	.64	1.06	62.89	-	-	10.31
Moradabad -	357	1.27	1.87	2.57	2.62	3.19	2.15	1.90	2.08	2.02	1.81	1.81	1.68	2.09	70.31	-	-	64.43
Meerut -	1,415	.87	1.00	1.08	1.12	1.38	1.42	1.40	1.04	1.38	1.04	1.68	1.41	1.31	50.25	-	2.12	36.75
Delhi -	299	5.29	3.39	4.93	10.80	15.45	16.32	3.31	5.51	13.01	17.20	11.34	7.43	9.10	264.21	-	3.35	179.63
Rohruk -	218	1.55	1.71	2.15	2.36	3.36	3.54	3.75	2.47	2.21	2.52	1.64	1.44	2.39	92.20	-	-	22.94
Hissar -	219	3.63	3.20	3.01	1.99	1.75	3.63	2.66	1.81	2.39	1.43	.64	1.23	2.24	91.78	-	-	13.17
Sirsa -	211	.15	-	.26	-	1.00	.57	1.82	1.47	2.29	2.33	.91	2.20	1.00	24.17	-	-	18.96
Kurnaul -	48	7.04	7.72	7.49	10.14	12.57	7.62	8.88	6.68	11.09	7.19	3.79	2.38	7.27	181.25	-	-	83.33
Umballa -	866	2.50	2.39	1.94	2.19	3.08	3.34	2.77	3.13	7.77	49.01	31.74	19.16	6.25	178.41	1.15	-	307.16
Loodianah -	145	7.14	6.01	5.60	6.11	6.15	6.40	6.67	6.08	6.37	6.21	5.09	4.30	5.82	195.86	-	-	20.69
Jullundur -	332	4.06	2.77	3.11	3.44	3.22	3.01	2.37	2.81	1.50	1.67	1.47	1.60	2.64	73.49	-	3.01	12.05
Ferozepore -	441	.72	.87	1.16	.66	.40	.74	.59	.42	.26	.30	.15	.05	.53	13.38	-	-	9.07
Umritsur -	554	4.34	4.50	4.56	5.10	4.18	3.64	2.97	2.55	3.47	5.66	7.21	14.41	5.16	166.43	-	-	138.99
Lahore -	1,644	20.48	15.47	6.17	3.31	2.07	2.14	1.00	1.60	1.68	1.48	1.24	1.50	4.81	93.13	-	.61	110.71
Lahore Female Gaol.	168	7.15	11.18	24.66	34.25	26.15	15.49	10.67	9.95	16.07	11.98	10.95	7.99	15.23	281.55	-	-	83.33
Sealkote -	191	2.40	1.42	1.08	.80	2.06	2.11	1.72	1.26	2.21	2.81	1.79	1.18	1.74	80.89	-	-	-
Dhumsalla -	137	4.47	3.92	3.48	3.55	3.88	4.74	3.97	5.53	6.36	4.26	2.95	1.85	4.06	174.45	-	-	29.20
Goordaspore -	295	5.86	6.27	6.51	3.84	6.98	4.63	3.31	3.73	3.01	4.63	2.48	1.52	4.28	80.68	-	-	23.73
Goojanwalla -	330	3.48	12.24	14.54	12.09	3.16	1.39	1.05	.92	1.30	.78	.69	.84	4.26	149.39	-	-	172.73
Goojrat -	264	.17	.33	.39	.03	.64	.37	.39	.02	.86	.57	.55	.47	.40	15.53	-	-	3.79
Shahpore -	239	.21	.45	1.10	2.14	2.19	2.21	1.08	2.10	1.44	.45	.90	.70	1.24	31.38	-	-	4.18
Jhelum -	220	.61	.87	.47	.94	1.79	2.02	1.65	2.29	2.50	1.76	2.54	.77	1.56	70.00	-	-	4.55
Goojaira -	315	2.55	2.42	1.75	1.83	1.34	1.09	1.19	1.35	1.06	.68	.40	1.30	1.36	40.64	-	-	28.57
Mooltan -	653	4.72	7.28	20.95	9.57	4.75	1.87	.72	.82	1.01	.65	.65	.50	3.87	113.32	-	1.53	111.79
Jhung -	268	5.64	3.43	1.34	2.21	5.36	4.07	4.64	2.88	2.39	1.77	1.45	1.70	2.95	81.71	-	-	-
Dera Ghazee Khan.	42	9.88	3.60	8.78	13.20	10.27	6.25	10.69	8.51	4.66	7.09	6.57	6.85	8.17	300.00	-	-	-
Dera Ismael Khan.	255	2.47	2.36	1.91	1.65	1.92	1.00	1.92	1.76	1.55	3.42	3.77	1.76	2.14	118.82	-	-	11.76
Kohat -	113	13.55	14.65	14.86	19.39	25.85	22.55	12.57	14.42	14.53	13.26	10.24	6.65	15.26	462.83	-	-	8.85
Bunnoo -	91	3.11	2.11	2.67	3.15	4.44	4.06	6.10	4.88	6.78	7.01	7.47	6.83	5.07	226.37	-	-	32.97
Rawalpindce -	763	6.54	7.97	11.61	11.48	6.06	5.35	4.81	3.68	5.53	5.36	5.87	6.29	6.70	204.44	-	-	76.02
Peshawur -	308	8.19	5.08	3.65	4.55	3.50	2.81	3.29	3.22	3.24	5.05	2.80	2.15	3.91	164.29	-	-	29.22

In employing the statistics of a floating as distinguished from a permanent population, it is necessary to keep in view the fact that we are dealing with two quantities which cannot be accurately represented by the same ratio. The average strength is a fixed quantity in the one case; in the other it represents a larger number of individuals than is shown by the average for any period, whose risk has been incurred for a portion of the period only. When, therefore, we give ratios in the same tabular form for European troops and for gaols, this distinction must be noted, for in so far they do not admit of comparison. As an index of results with which to compare future or past experience, such ratios are of value as furnishing an approximate estimate (for no rates can be positive when applied to an unstable body of men); and the nearness with which the gaol population maintains its average strength uninterrupted throughout a series of years entitles us to conclude that the aggregate of prisoners included in the risk from year to year is nearly identical. For three years past the average strength of the gaol population of the Presidency has scarcely altered; in these tables it is reckoned for those years at 52,871, 52,401, and 52,598, and for the first six months of 1865 the average is 52,606; and the same holds good in regard to Provinces. When, therefore, we say that in such a year, with an aggregate of so many prisoners and a daily average of so many, a certain number have died per 1,000; and again, that in a second year, with an equal number in the aggregate and in the average three times the number have died, the ratios in either case are perfectly comparable. It is quite a tangible fact, even when reduced to ratios, that three times the number of prisoners have died annually in the gaols of the Punjab since the introduction of typhus in 1861, or that when cholera dies out in any province the mortality is diminished by so much. When, however, we come to tabulate in ratios the results for individual gaols, the results become the less satisfactory the smaller the number of prisoners, and the longer of value as furnishing an approximate estimate (for no rates can be positive when applied to an unstable body of men); and the nearness with which the gaol population maintains its average strength uninterrupted throughout a series of years entitles us to conclude that the aggregate of prisoners included in the risk from year to year is nearly identical. For three years past the average strength of the gaol population of the Presidency has scarcely altered; in these tables it is reckoned for those years at 52,871, 52,401, and 52,598, and for the first six months of 1865 the average is 52,606; and the same holds good in regard to Provinces. When, therefore, we say that in such a year, with an aggregate of so many prisoners and a daily average of so many, a certain number have died per 1,000; and again, that in a second year, with an equal number in the aggregate and in the average three times the number have died, the ratios in either case are perfectly comparable. It is quite a tangible fact, even when reduced to ratios, that three times the number of prisoners have died annually in the gaols of the Punjab since the introduction of typhus in 1861, or that when cholera dies out in any province the mortality is diminished by so much. When, however, we come to tabulate in ratios the results for individual gaols, the results become the less satisfactory the smaller the number of prisoners, and the longer of value as furnishing an approximate estimate (for no rates can be positive when applied to an unstable body of men); and the nearness with which the gaol population maintains its average strength uninterrupted throughout a series of years entitles us to conclude that the aggregate of prisoners included in the risk from year to year is nearly identical. For three years past the average strength of the gaol population of the Presidency has scarcely altered; in these tables it is reckoned for those years at 52,871, 52,401, and 52,598, and for the first six months of 1865 the average is 52,606; and the same holds good in regard to Provinces. When,

3.—GAOLS OF THE BENGAL PRESIDENCY, 1864—continued.

TABLE showing the Ratio in, which the PRINCIPAL DISEASES have contributed to make up the ADMISSION RATE of the Year in the Gaol Hospitals of the *Bengal* Presidency.

STATIONS.	Average Strength for the Year.	ADMITTED INTO HOSPITAL PER CENT. OF AVERAGE STRENGTH.											Admitted per Cent. of the Average Strength from all Causes.	
		Cholera.	Fever, Intermittent.	Fever, Remittent and Continued.*	Dysentery and Diarrhoea.	Hepatitis.	Spleen Disease.	Respiratory Diseases.	Phtisis Pulmonalis.	Dropsy.	Atrophy and Anæmia.	Scoury.		All other Causes.
Alipore - - - - -	1,713	3.85	80.48	.17	54.88	.22	.39	2.51	1.06	1.00	1.23	-	26.32	172.11
Baraset - - - - -	139	.72	87.05	17.99	42.45	-	2.88	5.75	-	.72	-	-	60.43	217.99
Jessore - - - - -	489	9.61	14.72	10.02	26.59	.20	2.66	23.52	.61	.20	1.84	-	64.42	154.39
Kishnaghur - - - -	363	1.10	36.09	1.10	16.25	-	1.10	1.38	-	.83	1.88	-	19.56	78.79
Morshedabad - - -	186	-	36.02	.54	32.26	-	1.08	1.61	-	-	-	-	61.29	132.80
Howrah - - - - -	127	2.36	36.22	1.58	17.32	-	.79	-	-	-	2.36	-	20.47	81.10
Hooghly - - - - -	451	6.21	74.94	1.11	60.75	-	3.77	9.98	.67	1.77	-	.44	77.83	237.47
Burdwan - - - - -	411	1.95	65.94	1.22	30.66	-	1.70	3.89	.49	.97	2.43	-	80.29	189.54
Bancoorah - - - -	395	10.63	13.67	.76	11.39	-	.51	1.26	-	.51	-	-	75.19	113.92
Purulea - - - - -	183	-	32.78	-	18.58	-	-	1.64	.54	-	3.83	-	48.09	105.46
Ranceegunge - - -	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sooree - - - - -	285	-	37.54	5.97	7.37	-	1.75	1.05	.70	-	7.02	.35	36.84	98.59
Deogurh - - - - -	89	1.12	61.60	6.74	20.22	-	-	2.25	-	-	7.87	-	15.73	115.73
Rajnehal - - - - -	169	20.71	44.38	3.55	27.81	-	3.55	1.18	.59	.59	.59	-	64.50	167.45
Malda - - - - -	72	-	-	-	-	-	-	-	-	-	-	-	-	-
Dinajpore - - - - -	462	18.18	57.79	3.03	42.86	-	1.08	6.06	.22	3.46	-	.22	24.46	157.36
Rampore Bauleah -	394	15.99	36.55	.25	24.37	.51	1.27	7.36	.25	1.02	1.52	-	38.83	127.92
Rungpore - - - - -	323	.93	42.73	4.34	40.25	.93	4.64	12.07	.31	4.64	4.64	-	53.56	169.04
Bograh - - - - -	171	.59	50.29	.59	48.54	-	-	7.60	1.17	1.17	-	-	57.89	167.84
Mymensingh - - - -	474	-	45.36	3.59	48.52	.21	1.27	10.34	.42	3.59	1.05	.42	28.27	143.04
Pubna - - - - -	141	18.44	90.07	2.13	65.79	1.42	2.13	2.83	.71	1.42	1.42	-	129.79	319.15
Furreedpore - - - -	410	.24	71.22	5.37	41.71	-	7.07	6.58	.73	-	.98	-	62.44	196.34
Backergunge - - -	495	8.89	19.60	-	38.38	.61	.20	3.03	-	.81	3.23	1.82	20.00	96.57
Noacolly - - - - -	224	2.23	114.29	.45	50.69	-	-	-	5.12	.45	-	.45	139.28	311.16
Chittagong - - - -	327	.31	50.15	-	12.23	.92	-	2.14	.31	2.14	-	-	16.51	84.71
Tipperah - - - - -	398	.25	50.75	.25	17.09	.25	-	5.03	.50	-	.75	-	16.08	90.95
Dacca - - - - -	463	1.30	56.59	56.16	24.19	-	1.94	6.48	.22	-	.86	-	41.25	188.99
Sylhet - - - - -	359	-	71.87	.28	28.41	-	.83	6.13	.56	.28	-	2.51	70.75	181.62
Cherrapoonjee - - -	17	-	-	-	-	-	-	-	-	-	-	-	-	-
Cachar - - - - -	211	4.74	64.45	-	62.09	-	8.53	2.84	-	2.37	-	-	58.29	203.22
Gowalparah - - - -	149	15.44	20.80	75.84	24.16	4.70	2.01	9.40	-	8.05	4.03	.67	124.83	289.93
Gowhaty - - - - -	153	1.96	69.28	-	46.41	-	1.31	13.72	-	-	-	-	50.33	153.01
Seebagur - - - - -	123	-	59.35	6.51	43.90	-	.81	.81	-	2.44	3.25	-	31.71	148.78
Nowgong - - - - -	92	-	94.56	3.26	71.74	-	-	-	-	1.09	1.09	-	36.96	208.70
Tezpor - - - - -	198	-	35.86	3.54	34.34	-	2.53	10.10	-	-	7.07	-	50.50	143.94
Debrooghur - - - -	125	.50	20.80	-	45.00	-	-	1.60	-	4.80	-	-	56.80	130.40
Midnapore - - - - -	544	1.10	60.29	6.25	28.86	.55	.37	.92	.37	.74	.74	-	47.79	147.98
Balasore - - - - -	210	-	48.10	1.43	37.14	1.90	-	22.38	2.38	-	1.90	-	66.67	181.90
Cuttack - - - - -	353	.142	50.99	.28	30.03	-	-	1.98	.85	.28	5.10	-	71.96	162.89
Poorree - - - - -	32	-	-	-	-	-	-	-	-	-	-	-	-	-
Sumbulpore - - - -	175	38.29	66.29	.57	31.43	-	-	9.71	-	-	-	-	228.57	374.86
Chyebassa - - - - -	215	1.86	29.77	1.86	18.14	.93	2.33	.46	.46	.93	-	.93	61.86	119.53
Ranchee - - - - -	290	-	33.45	1.72	13.45	-	1.04	2.41	.69	.34	.34	1.38	48.97	103.79
Hazareebaugh - - -	439	-	33.03	-	15.04	.91	.68	4.78	.91	1.14	-	3.87	65.61	125.97
Monghyr - - - - -	362	.28	74.31	1.66	63.26	-	-	6.08	.55	.28	-	-	72.92	219.34
Bhaugulpore - - - -	359	15.88	74.93	-	30.92	-	.28	.84	-	.55	-	-	82.73	216.13
Purneah - - - - -	522	-	46.36	.19	49.04	-	.77	4.79	.38	.77	1.15	-	77.59	181.04
Darjeeling - - - - -	51	-	-	-	-	-	-	-	-	-	-	-	-	-
Gyah - - - - -	339	.30	30.68	1.77	25.96	.30	-	.88	.88	.59	1.47	.30	29.20	92.33
Patna - - - - -	467	6.00	55.25	3.86	46.25	-	.21	1.28	-	-	1.28	2.36	17.56	134.05
Deegah - - - - -	79	-	-	-	-	-	-	-	-	-	-	-	-	-
Arrah - - - - -	499	1.20	8.22	.60	17.03	-	-	-	-	-	-	-	2.51	30.46
Chumparun - - - - -	203	3.46	42.37	-	30.05	-	1.48	4.43	-	.42	1.48	-	29.06	111.82
Mozufferpore - - - -	433	3.47	42.03	17.09	116.63	-	.92	2.54	-	.23	16.17	-	49.42	248.50
Chuprah - - - - -	440	2.05	18.18	.68	38.64	.20	.20	-	-	-	-	.20	18.86	79.01
Ghazee-pore - - - -	662	.60	3.02	.15	2.57	-	-	1.21	-	.15	-	-	11.18	18.88
Benares - - - - -	1,306	3.75	10.41	.08	11.87	.08	.38	2.30	2.60	.08	-	.08	22.89	54.62
Mirzapore - - - - -	351	1.14	14.25	1.14	4.56	-	-	.28	-	-	.85	-	29.63	51.85
Azimgurh - - - - -	358	1.12	15.08	.28	16.76	-	-	.84	-	-	-	-	21.23	65.31
Juanpore - - - - -	269	-	18.96	1.49	15.98	-	-	.74	-	-	1.12	-	26.39	64.68
Goruckpore - - - - -	727	5.78	25.86	.69	41.13	-	.14	3.16	.14	.27	.82	-	83.36	161.35
Gondah - - - - -	92	-	40.22	-	17.39	-	-	-	-	-	-	-	78.26	135.87
Baraitch - - - - -	107	-	71.96	-	35.51	-	.94	2.80	-	-	-	-	69.16	180.37
Fyzabad - - - - -	988	5.67	19.84	.10	23.79	-	-	.30	-	-	-	-	8.30	58.00
Sultanpore - - - - -	525	10.23	32.95	1.33	24.24	-	.19	.76	-	-	-	-	34.85	104.55
Rae Bareilly - - - -	135	-	38.52	1.48	13.33	-	-	.74	-	-	1.48	-	42.97	98.52
Pertabgurh - - - - -	162	.62	35.27	4.94	27.78	-	.62	6.79	-	-	-	-	74.07	153.09
Huidui - - - - -	148	-	6.76	1.35	6.76	-	-	1.35	-	.68	-	-	33.78	50.68
Luckimpore - - - - -	115	-	46.06	1.74	40.00	-	-	1.74	-	-	.87	-	93.91	185.22
Lucknow - - - - -	2,550	.12	6.51	3.33	25.22	-	.16	.78	.04	.04	.04	-	29.02	65.26
Sectapore - - - - -	779	.13	54.04	.77	27.08	.26	.13	2.95	-	-	.26	-	47.37	132.99

* In classing Intermittent Fevers, and Remittent and Continued Fevers separately, in place of including both groups under the general head "Fevers," it was intended that the predominance of the ratios should indicate those gaols in which Gaol Typhus had prevailed. The object, however, is incompletely fulfilled, since in some gaols it has become the custom to return a certain number of cases of fever regularly as Remittent or Continued, while others return all fevers as Intermittent.

3.—GAOLS OF THE BENGAL PRESIDENCY, 1864—continued.

TABLE showing the Ratio in which the Principal Diseases have contributed to make up the Admission Rate, &c.—continued.

STATIONS.	Average Strength for the Year.	ADMITTED INTO HOSPITAL PER CENT. OF AVERAGE STRENGTH.											Admitted per Cent. of the Average Strength from all Causes.	
		Cholera.	Fever, Intermittent.	Fever, Remittent and Continued.	Dysentery and Diarrhoea.	Hepatitis.	Spleen Disease.	Respiratory Diseases.	Phthisis Pulmonalis.	Dropsy.	Atrophy and Anæmia.	Scurvy.		All other Causes.
Ch - - - - -	206	49	22.81	2.43	6.31	-	-	8.74	97	-	-	-	58.74	100.49
meerpoore - - - - -	133	-	51.13	-	15.01	-	1.50	1.50	-	-	-	-	81.96	151.13
ie - - - - -	128	-	70.31	1.56	8.59	-	-	5.47	-	-	3.91	78	60.16	150.78
atchghur - - - - -	404	-	6.68	77.23	5.20	-	25	1.24	-	25	-	-	21.53	112.38
wnpoore - - - - -	279	-	36.20	44.09	10.39	-	-	36	-	-	72	-	48.74	140.50
nda - - - - -	258	3.10	55.43	1.94	22.43	-	2.71	2.71	39	39	-	-	59.69	149.23
gode - - - - -	116	-	55.17	27.59	19.83	-	-	3.45	-	-	-	86	84.48	191.38
ahabad - - - - -	2,192	4.70	31.98	23	14.87	09	78	1.28	27	-	27	-	40.92	95.39
ipore (11 months, Jan. to Nov.)	343	12.53	41.40	18.37	19.24	-	-	1.17	-	-	1.17	-	17.49	111.37
aspoore - - - - -	81	6.17	14.82	2.47	16.05	-	-	1.23	-	-	-	-	29.63	70.37
ndhara - - - - -	417	-	33.09	24	23.98	-	24	96	-	-	1.68	-	37.41	97.60
anda - - - - -	170	8.24	54.12	16.47	-	-	-	1.76	-	-	1.18	-	50.00	131.77
owtah - - - - -	68	-	-	-	-	-	-	-	-	-	-	-	-	-
gpoore - - - - -	559	5.01	63.86	72	18.07	-	-	72	18	-	-	-	49.19	137.75
indwara - - - - -	100	-	32.00	2.00	16.00	-	-	1.00	-	-	-	-	61.00	112.00
oncha - - - - -	30	-	-	-	-	-	-	-	-	-	-	-	-	-
undia - - - - -	59	-	-	-	-	-	-	-	-	-	-	-	-	-
bbulpore (Civil)	471	-	39.91	7.22	19.11	-	-	4.67	-	-	-	-	53.29	121.20
amoh - - - - -	207	-	87.92	48	13.04	-	97	4.34	-	-	97	-	55.07	172.79
agor - - - - -	348	13.22	72.13	2.30	42.53	-	57	8.62	29	-	2.59	29	122.13	264.66
ur-ingpoore - - - - -	192	-	42.23	7.81	19.79	-	2.09	1.56	-	52	-	-	86.98	161.93
lutpoore - - - - -	239	-	46.33	-	14.29	-	39	77	-	-	1.16	-	28.95	91.89
ansi - - - - -	298	-	73.15	-	16.78	-	1.68	6.38	-	-	-	-	86.91	184.90
onee - - - - -	268	3.73	19.03	7.84	12.31	-	0.37	1.49	-	-	-	-	30.23	75.00
itool - - - - -	163	-	50.92	-	8.59	-	-	4.29	-	-	61	-	80.37	144.78
hore - - - - -	95	-	-	-	-	-	-	-	-	-	-	-	-	-
oshungabad - - - - -	272	-	55.15	37	9.92	-	37	3.68	-	-	-	-	62.50	131.99
undaisir - - - - -	148	2.03	64.19	3.38	28.38	-	3.38	12.84	2.70	-	2.03	4.73	43.91	167.57
mere - - - - -	229	-	72.05	10.92	24.89	-	44	8.73	-	2.18	44	44	45.85	165.94
aur - - - - -	103	-	52.43	2.91	8.74	-	-	97	-	-	10.68	-	96.11	171.84
utra - - - - -	243	-	66.67	16.05	20.58	-	-	7.40	-	-	-	-	65.43	176.13
ra - - - - -	1,993	-	14.60	65.63	8.33	-	-	40	15	10	1.11	10	23.18	113.60
cundra - - - - -	257	-	-	-	-	-	-	-	-	-	-	-	-	-
awah - - - - -	183	-	54.61	1.09	15.85	-	-	3.28	-	55	-	-	71.58	146.09
ynpoore - - - - -	240	-	47.08	-	15.84	-	83	1.67	-	-	42	-	58.33	124.17
lyghur - - - - -	165	-	41.82	7.88	12.73	-	-	3.03	60	-	-	-	61.82	127.88
lundshuhur - - - - -	141	-	34.75	7.09	9.93	-	-	1.42	-	-	-	-	72.34	125.53
ahjhanpore - - - - -	258	-	18.99	3.49	6.59	-	-	9.69	-	-	-	-	81.78	120.54
reilly - - - - -	1,449	-	34	17.46	4.35	07	-	83	-	14	14	-	4.62	27.95
adaon - - - - -	212	-	20.28	15.57	5.19	-	-	1.41	-	-	1.89	-	76.42	120.76
harunpoore - - - - -	204	-	10.79	-	3.92	-	-	1.47	-	-	49	-	29.41	46.08
jiore - - - - -	230	-	43.48	1.74	12.61	-	43	8.70	-	-	-	-	93.04	160.00
jiore - - - - -	230	-	43.48	1.74	12.61	-	43	8.70	-	-	-	-	93.04	160.00
eyrah - - - - -	67	-	47.76	4.47	29.85	-	-	2.99	-	-	2.99	-	82.09	170.15
morah - - - - -	130	-	99.23	1.54	27.69	1.54	-	11.54	-	-	6.92	-	141.54	290.00
ozuffernuggur - - - - -	97	-	21.65	-	6.19	-	-	2.06	-	-	-	-	32.99	62.89
oradabad - - - - -	357	28	12.60	16.81	13.45	28	-	5.66	-	28	1.96	-	24.09	70.31
eerut - - - - -	1,415	-	21.70	71	6.29	07	07	2.12	21	-	21	07	18.80	50.25
elhi - - - - -	299	-	145.49	52.48	19.40	1.00	2.01	3.01	-	-	1.00	-	39.46	264.21
htuk - - - - -	218	-	37.16	2.29	8.71	-	-	92	-	-	-	46	42.66	92.20
issar - - - - -	219	-	54.34	-	6.39	-	-	1.37	-	-	-	-	29.68	91.78
rsa - - - - -	211	-	11.37	4.74	2.37	-	-	95	47	-	-	-	4.27	24.17
urnaul - - - - -	48	-	-	-	-	-	-	-	-	-	-	-	-	-
mballah - - - - -	866	12	39.72	78.29	25.63	35	12	3.46	12	-	5.31	-	25.29	178.41
odianah - - - - -	145	-	57.93	1.38	20.69	-	2.07	-	69	-	11.03	69	101.38	195.86
llundur - - - - -	332	-	19.88	60	13.55	-	30	2.11	-	30	60	-	36.45	73.49
rozepore - - - - -	441	-	3.17	23	2.72	-	-	1.13	-	-	23	-	5.90	13.38
mrirtsur - - - - -	554	-	102.53	-	9.93	36	-	2.35	18	-	54	-	50.54	166.13
hore - - - - -	1,644	-	57.42	15.45	4.74	-	43	1.89	18	06	7.3	06	12.17	93.13
hore Female Gaol	168	-	135.72	35.12	14.88	1.19	7.14	3.57	-	-	3.57	1.19	79.17	231.55
alkote - - - - -	191	-	8.90	-	5.76	-	-	1.05	-	-	-	-	15.18	30.89
urnmsalla - - - - -	137	-	90.51	3.65	23.36	-	-	5.84	73	1.46	-	-	48.90	174.15
oordaspoore - - - - -	295	-	43.73	3.05	6.10	34	1.02	34	-	-	34	-	25.76	80.68
oojranwalla - - - - -	330	-	80.30	31.52	16.36	91	61	1.52	30	30	30	-	17.27	149.39
oojrat - - - - -	264	-	5.68	-	3.03	-	-	76	-	-	-	-	6.06	15.53
ahpoore - - - - -	239	-	7.95	-	1.67	84	-	2.93	-	-	-	-	17.99	31.38
elum - - - - -	220	-	39.55	-	9.55	-	-	91	45	-	-	-	19.54	70.00
elum - - - - -	315	-	13.02	32	4.13	32	-	4.44	-	-	1.90	32	16.19	40.64
oojaira - - - - -	653	-	91.88	-	10.57	-	15	61	-	-	2.15	61	7.35	113.32
ooltan - - - - -	268	-	15.67	37	8.58	-	1.50	4.48	37	37	37	3.73	46.27	81.71
ung - - - - -	42	-	-	-	-	-	-	-	-	-	-	-	-	-
era Ghazee Khan	255	-	43.92	3.14	12.94	-	-	10.59	-	39	-	39	47.45	118.82
era Ismael Khan	113	-	-	-	-	-	-	-	-	-	-	-	-	-
ohat - - - - -	91	-	-	-	-	-	-	-	-	-	-	-	-	-
unnoo - - - - -	763	-	139.32	-	12.06	39	1.05	3.51	39	13	2.10	13	42.33	201.44
awulpindee - - - - -	308	-	89.94	1.30	29.87	-	-	1.95	-	-	-	5.19	36.04	164.29

See Note, page 197.

B B 4

3.—GAOLS OF THE BENGAL PRESIDENCY, 1864—continued.

TABLE showing the PREVALENCE of CHOLERA in each Month, and the Distribution of the DISEASE by STATIONS and PROVINCES.

STATIONS.	Average Strength for the Year.	NUMBER OF ADMISSIONS INTO HOSPITAL IN EACH MONTH.												Total Admissions.	Admitted per Cent. of Average Strength.	Number of Deaths.	Died per 1,000 of Average Strength.
		Jan.	Feb.	March.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.				
Alipore - - - -	793	2	4	14	19	7	3	3	3	4	1	6	3	69	-	17	-
Baraset - - - -	139	-	-	1	-	-	-	-	-	-	-	-	-	1	-	-	-
Jessore - - - -	489	-	-	-	46	-	-	-	1	-	-	-	-	47	-	22	-
Kishnaghar - - -	363	-	-	3	-	-	-	-	-	1	-	-	-	4	-	3	-
Moorsheadabad -	186	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Howrah - - - -	127	-	-	-	1	-	-	-	-	-	-	2	-	3	-	1	-
Hooghly - - - -	451	-	17	2	3	-	-	1	4	-	1	-	-	28	-	7	-
Burdwan - - - -	411	-	-	4	4	-	-	-	-	-	-	-	-	8	-	4	-
Bancoorah - - -	395	-	8	31	-	-	3	-	-	-	-	-	-	42	-	16	-
Purulea - - - -	183	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Raneegunge - - -	26	-	2	1	-	-	-	-	-	-	-	-	-	3	-	1	-
Sooree - - - -	285	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Rajmehal - - - -	169	-	-	-	2	33	-	-	-	-	-	-	-	35	-	14	-
Deogurh - - - -	89	-	-	1	-	-	-	-	-	-	-	-	-	1	-	-	-
Malda - - - -	72	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dinapore - - - -	462	-	-	6	70	8	-	-	-	-	-	-	-	84	-	37	-
Rampore Bauleah -	394	-	10	45	7	1	-	-	-	-	-	-	-	63	-	18	-
Rungpore - - - -	323	-	-	-	3	-	-	-	-	-	-	-	-	3	-	1	-
Bograh - - - -	171	-	-	-	-	-	-	-	-	-	-	1	-	1	-	1	-
Mymensingh - - -	474	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pabna - - - -	141	-	-	-	14	2	-	-	-	-	-	2	8	26	-	-	-
Furreedpore - - -	410	-	1	-	-	-	-	-	-	-	-	-	-	1	-	10	-
Backergunge - - -	495	3	2	19	7	-	1	-	-	-	6	5	1	44	-	1	-
Noacally - - - -	224	-	-	-	-	1	-	4	-	-	-	-	-	5	-	17	-
Chittagong - - -	327	-	-	-	-	1	-	-	-	-	-	-	-	1	-	2	-
Tipperah - - - -	398	-	-	1	-	-	-	-	-	-	-	-	-	1	-	-	-
Dacca - - - -	463	1	1	2	2	-	-	-	-	-	-	-	-	6	-	1	-
Sylhet - - - -	359	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-
Cherrapunjee - -	17	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cachar - - - -	211	-	-	-	-	-	1	1	-	-	-	8	-	10	-	-	-
Gowalparah - - -	149	-	-	-	3	1	11	5	2	1	-	-	-	23	-	7	-
Gowhatty - - - -	153	-	-	-	-	3	-	-	-	-	-	-	-	3	-	2	-
Seeksagur - - - -	123	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-
Nowgong - - - -	92	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tezporo - - - -	198	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Debrooghur - - -	125	-	-	-	-	-	-	-	1	-	-	-	-	1	-	-	-
Midnapore - - - -	544	-	2	3	-	1	-	-	-	-	-	-	-	6	-	-	-
Balasore - - - -	210	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4	-
Cuttack - - - -	353	-	-	1	-	-	-	4	-	-	-	-	-	5	-	-	-
Pooree - - - -	32	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3	-
Sumbulpore - - -	175	-	-	-	58	9	-	-	-	-	-	-	-	67	-	46	-
Chyebassa - - - -	215	-	-	1	1	2	-	-	-	-	-	-	-	4	-	-	-
Ranchee - - - -	290	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hazareebaugh - -	439	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Monghyr - - - -	362	-	-	-	1	-	-	-	-	-	-	-	-	1	-	-	-
Bhaugulpore - - -	359	-	-	5	24	12	15	1	-	-	-	-	-	57	-	10	-
Purneah - - - -	522	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Darjeeling - - -	51	-	-	-	-	-	2	-	-	-	-	-	-	2	-	2	-
	14,441	6	47	140	265	81	36	19	11	6	8	24	12	655	4.54	250	17.31
Gyah - - - -	339	-	-	-	-	1	-	-	-	-	-	-	-	1	-	1	-
Patna - - - -	467	-	-	2	24	1	-	-	1	-	-	-	-	28	-	8	-
Deegah - - - -	76	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Arrah - - - -	499	-	-	1	-	-	5	-	-	-	-	-	-	6	-	3	-
Chumparua - - - -	203	-	-	-	1	-	4	-	-	-	-	-	-	5	-	3	-
Mozufferpore - - -	433	-	-	1	13	1	-	-	-	-	-	-	-	15	-	1	-
Chuprah - - - -	440	-	-	1	1	1	1	1	1	2	1	-	-	9	-	1	-
Ghazeeepore - - -	662	-	4	-	-	-	-	-	-	-	-	-	-	4	-	3	-
Benares - - - -	1,306	-	-	2	1	-	-	2	44	-	-	-	-	49	-	26	-
Mirzapore - - - -	351	-	2	-	-	-	-	-	-	-	-	1	1	4	-	1	-
Azinghur - - - -	358	-	-	-	-	-	4	-	-	-	-	-	-	4	-	1	-
Juanpore - - - -	269	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Goruckpore - - - -	727	-	-	-	2	3	20	11	6	-	-	-	-	42	-	19	-
Gondah - - - -	92	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Baraitch - - - -	107	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Fyzabad - - - -	988	-	-	-	56	-	-	-	-	-	-	-	-	56	-	19	-
Sultanpore - - - -	528	-	-	-	-	49	5	-	-	-	-	-	-	54	-	18	-
Rae Bareilly - - -	135	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pertabghur - - -	162	-	-	-	1	-	-	-	-	-	-	-	-	1	-	-	-
Hurdul - - - -	148	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Luckimpore - - - -	115	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Lucknow - - - -	2,550	-	-	3	-	-	-	-	-	-	-	-	-	3	-	-	-
Seetapore - - - -	779	-	-	-	-	-	-	1	-	-	-	-	-	1	-	1	-
Etah - - - -	206	-	-	-	1	-	-	-	-	-	-	-	-	1	-	-	-
Humeerpore - - -	133	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Oraie - - - -	128	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Futteghur - - - -	404	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cawnpore - - - -	279	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Banda - - - -	258	-	-	-	-	-	8	-	-	-	-	-	-	8	-	3	-
Nagode - - - -	116	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Allakabad - - - -	2,192	-	-	-	1	-	101	-	1	-	-	-	-	103	-	28	-
	15,450	-	6	10	101	56	148	15	53	2	1	1	1	394	2.55	136	8.80

3.—GAOLS OF THE BENGAL PRESIDENCY, 1864—continued.

TABLE showing the Prevalence of Cholera in each Month, and the Distribution of the Disease, &c.—continued.

STATIONS.	Average Strength for the Year.	NUMBER OF ADMISSIONS INTO HOSPITAL IN EACH MONTH.												Total Admis- sions.	Admitted per Cent. of Average Strength.	Number of Deaths.	Died per 1,000 of Average Strength.
		Jan.	Feb.	March.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.				
Raipore - - - -	343	-	-	-	-	-	43	-	-	-	-	-	-	43	-	23	-
Belaspore - - - -	81	-	-	-	-	5	-	-	-	-	-	-	-	5	-	3	-
Bandhara - - - -	417	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chanda - - - -	170	-	-	1	12	1	-	-	-	-	-	-	-	14	-	5	-
Nagpore - - - -	559	-	-	24	3	-	-	1	-	-	-	-	-	28	-	9	-
Chindwara - - - -	100	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Kowtah - - - -	68	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sironcha - - - -	30	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Mundla - - - -	59	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Jubbulpore (Civil) - - - -	471	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Jubbulpore (Thuggee) - - - -	565	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dumoh - - - -	207	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Saugor - - - -	348	-	-	-	-	-	-	17	23	3	3	-	-	46	-	16	-
Nursingpore - - - -	192	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Lullutpore - - - -	259	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Jhansi - - - -	298	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Seonee - - - -	268	-	-	-	-	4	6	-	-	-	-	-	-	10	-	6	-
Baitool - - - -	163	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sehore - - - -	95	-	-	-	-	5	1	-	-	-	-	-	-	6	-	-	-
Hosungabad - - - -	272	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Mundlaiser - - - -	148	-	-	-	-	3	-	-	-	-	-	-	-	3	-	1	-
Ajnere - - - -	229	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Beaur - - - -	103	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	5,448	-	-	25	15	18	50	18	23	3	3	-	-	155	2·85	63	11·56
Muttra - - - -	243	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Agra - - - -	1,963	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Secundra - - - -	257	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Etawah - - - -	183	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Mynpoorie - - - -	340	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Allyghur - - - -	165	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bolundshuhur - - - -	141	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Shahjehanpore - - - -	258	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bareilly - - - -	1,449	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Budaon - - - -	212	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Seharunpore - - - -	204	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bijnore - - - -	230	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Deyrah - - - -	67	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Almorah - - - -	130	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Mozuffernagpur - - - -	97	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Moradabad - - - -	357	-	-	-	-	-	-	-	1	-	-	-	-	1	-	-	-
Meerut - - - -	1,415	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	7,641	-	-	-	-	-	-	-	1	-	-	-	-	1	·01	-	-
Delhi - - - -	299	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Rohtuk - - - -	218	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hissar - - - -	219	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sirsa - - - -	211	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Kurnaul - - - -	48	-	-	-	-	-	-	-	-	-	-	-	-	1	-	1	-
Umballa - - - -	866	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-
Loodianah - - - -	745	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Jullundur - - - -	332	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ferozepore - - - -	441	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Umritour - - - -	554	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Lahore - - - -	1,644	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Lahore Female Gaol - - - -	168	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sealkote - - - -	191	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dhurnsalla - - - -	137	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Goordaspore - - - -	295	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Goojranwalla - - - -	330	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Goojrat - - - -	264	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Shahpore - - - -	239	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Jhelum - - - -	220	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Goojaira - - - -	315	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Mooltan - - - -	653	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Jhang - - - -	268	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dera Ghazee Khan - - - -	42	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dera Ismael Khan - - - -	255	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Kohat - - - -	113	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Bunnoo - - - -	91	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Rawalpindee - - - -	763	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Peshawur - - - -	308	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	9,630	-	-	-	1	-	-	-	-	-	-	-	-	1	·01	1	·10
BENGAL PRESIDENCY -	52,598	6	53	175	382	155	234	52	88	11	12	25	12	1,206	2·29	450	8·56

TABLE showing the MORTALITY in each GAOL, the CAUSES of DEATH, and the Ratio of DEATHS to STRENGTH.

STATIONS.	Average Strength for the Year.	CAUSES OF DEATHS IN HOSPITAL.														Total Number of Deaths.	DIED PER 1,000 OF AVERAGE STRENGTH.				
		Cholera.	Small-pox.	Fever.	Apoplexy.	Dysentery & Diarrhea.	Hepatitis.	Spleen Disease.	Respiratory Diseases.	Heart Diseases.	Phthisis Pulmonalis.	Dropsy.	Scurvy.	Atrophy & Anemia.	Wounds & Accidents.		All other Causes.	Died out of Hospital.	A. Cholera.	B. Out of Hospital.	C. All Causes.
Alipore	1,793	17	-	3	-	59	2	-	9	2	16	-	-	-	-	5	-	113	9.48	-	63.02
Baraset	139	-	-	1	-	5	-	1	1	-	-	-	-	-	-	-	9	-	-	64.75	
Jessore	489	22	-	-	1	4	-	-	3	-	2	1	-	1	-	2	1	37	44.99	2.04	75.66
Kishnaghur	363	3	-	-	-	7	-	1	-	-	-	2	-	-	-	1	-	14	8.26	-	38.57
Moorsheadabad	186	-	-	2	-	11	-	-	3	-	-	-	-	-	-	-	1	17	-	5.38	91.40
Howrah	127	1	-	1	-	3	-	1	-	-	-	-	-	-	-	-	-	6	7.87	-	47.24
Hooghly	451	7	-	4	-	20	-	-	-	-	3	1	-	-	-	-	-	35	15.52	-	77.61
Burdwan	411	4	-	2	-	10	-	-	-	-	-	1	-	4	-	1	1	23	9.73	2.43	55.96
Bancoorah	395	16	-	3	-	4	-	-	-	-	-	2	-	-	-	2	-	27	40.51	-	68.35
Purulea	183	-	-	-	-	1	-	-	-	-	1	1	-	3	-	1	-	7	-	-	38.25
Raneegunge	26	1	-	1	-	-	-	-	-	-	-	-	-	-	1	-	1	4	-	-	-
Sooree	285	-	-	-	1	1	-	-	-	-	2	-	-	3	-	-	1	8	-	3.51	28.07
Rajmehal	169	14	-	-	-	-	-	-	1	-	-	-	-	-	-	1	-	16	82.84	-	94.67
Deogurh	89	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	11.24
Malda	72	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	1	-	-	13.89
Dinapore	462	37	-	-	1	34	-	1	2	-	1	2	-	-	-	-	-	78	80.09	-	168.83
Rampore Bauleah	394	18	-	-	-	8	1	-	1	-	-	2	-	-	1	1	-	32	45.69	-	81.22
Rungpore	323	1	-	2	-	10	-	1	3	-	-	6	-	3	1	1	-	28	3.10	-	86.69
Bograh	171	1	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	3	5.85	-	17.54
Mymensingh	474	-	2	3	1	16	-	-	-	1	1	5	-	2	-	2	-	33	-	-	69.62
Pubna	141	10	-	1	-	2	-	-	-	1	1	-	-	-	-	-	-	15	70.92	-	106.38
Furreedpore	410	1	-	1	1	2	-	-	2	-	3	-	-	2	-	1	1	14	2.44	2.44	34.15
Backergunge	495	17	-	2	1	61	-	-	4	-	-	3	-	4	1	4	-	97	34.34	-	195.96
Noacolly	224	2	-	1	-	2	-	-	-	-	-	-	-	-	-	2	-	7	8.93	-	31.25
Chittagong	327	-	-	1	-	-	3	-	-	-	1	2	-	-	-	-	-	7	-	-	21.41
Tipperah	398	1	-	-	-	2	-	-	2	-	-	-	-	3	-	1	1	10	2.51	2.51	25.12
Dacca	463	1	4	2	-	-	-	-	-	2	-	-	-	1	-	2	-	14	2.16	-	30.24
Sylhet	359	-	-	-	-	4	-	-	1	-	2	-	-	-	-	-	-	7	-	-	19.50
Cherrapoonjee	17	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-
Cachar	211	7	-	-	-	9	-	-	-	-	-	2	-	-	-	3	-	21	33.18	-	99.53
Gowalparah	149	2	-	1	-	1	-	-	2	-	-	3	-	2	-	1	-	12	13.42	-	80.54
Gowhatty	153	2	-	-	-	7	-	-	1	-	1	-	-	-	-	-	-	11	13.07	-	71.90
Seesagur	123	-	-	1	-	4	-	-	-	-	-	-	-	4	-	-	-	9	-	-	73.17
Nowgong	92	-	-	-	-	2	-	-	-	-	-	1	-	-	-	-	-	3	-	-	32.61
Tezpor	198	-	-	-	-	5	-	-	1	-	-	-	-	1	-	-	-	7	-	-	35.35
Debrooghur	125	-	-	-	-	8	-	-	-	1	-	4	-	-	-	-	-	13	-	-	104.00
Midnapore	544	4	-	2	1	2	-	-	1	2	-	-	-	-	-	1	2	15	7.35	3.67	27.57
Balasore	210	-	-	-	-	3	1	-	2	-	-	-	-	-	-	-	1	7	-	4.76	33.33
Cuttack	353	3	-	1	-	8	-	-	2	-	2	-	-	7	-	4	-	27	8.50	-	76.49
Pooree	32	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sumbulpore	175	46	-	2	-	9	-	-	1	-	-	-	-	-	-	-	-	58	262.86	-	331.43
Chyebassa	215	-	-	2	-	6	-	-	-	-	1	1	-	-	-	1	-	11	-	-	51.16
Ranchee	290	-	-	5	1	-	-	-	-	-	1	1	-	-	-	-	-	8	-	-	27.59
Hazareebaugh	439	-	-	-	-	5	-	-	2	-	4	2	-	-	-	-	-	13	-	-	29.61
Monghyr	362	-	-	2	-	12	-	-	-	1	-	1	-	-	-	-	-	16	-	-	44.20
Bhaugulpore	359	10	-	1	-	10	-	-	-	-	-	-	-	1	-	-	-	22	27.85	-	61.28
Purneah	522	-	-	5	1	29	-	2	3	-	2	2	-	-	-	3	-	47	-	-	90.04
Darjeeling	51	2	-	1	-	1	-	-	-	-	-	-	-	-	1	-	-	5	39.22	-	98.04
	14,441	250	6	54	9	390	7	7	47	7	50	45	-	41	6	40	10	969	17.31	69	67.10
Gyah	339	1	-	-	-	4	-	-	2	-	-	-	1	-	-	1	1	10	2.95	2.95	29.50
Patna	467	8	1	5	-	16	-	1	1	-	-	-	-	1	-	1	-	34	17.13	2.14	72.80
Deegah	79	-	-	-	-	3	-	-	-	-	-	1	-	-	-	1	-	5	-	-	63.29
Arrah	499	3	-	1	-	24	-	-	1	-	-	-	1	-	-	1	-	31	6.01	-	62.12
Chumparun	203	3	-	2	-	5	-	-	-	-	-	-	-	3	-	1	-	14	14.78	-	68.97
Mozufferpore	433	1	-	-	-	18	-	-	1	-	-	-	-	3	-	1	-	24	2.31	-	55.43
Chuprah	440	1	-	-	-	29	-	-	-	-	-	-	-	-	-	1	1	32	2.27	2.27	72.72
Ghazee pore	662	3	-	1	-	3	-	-	1	-	-	1	-	-	-	-	-	9	4.53	-	13.60
Benares	1,306	26	1	-	2	33	-	2	6	-	19	-	-	-	-	13	-	102	19.91	-	98.10
Mirzapore	351	1	1	3	2	6	-	-	-	-	-	-	-	2	-	2	-	17	2.85	-	48.43
Azimghur	358	1	-	-	-	1	-	-	-	-	-	-	-	1	-	1	-	3	2.79	-	8.35
Juanpore	269	-	-	2	-	5	-	-	-	-	-	-	-	-	-	1	-	9	-	-	33.46
Coruckpore	727	19	-	3	1	55	-	1	-	-	1	-	-	5	-	4	-	89	26.13	-	122.42
Gondah	92	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Baraitch	107	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Fyzabad	988	19	-	2	-	31	-	-	-	-	-	-	-	-	-	-	-	52	19.23	-	52.63
Sultanpore	522	18	-	3	1	5	-	1	1	-	-	-	-	-	1	3	-	33	34.09	-	62.50
Rae Bareilly	135	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	1	-	-	7.41
Pertabghur	162	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	6.17
Hurdui	148	-	-	-	-	2	-	-	-	-	-	1	-	-	1	1	-	5	-	-	33.78
Luckimpore	115	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	1	-	-	8.70
Lucknow	2,550	-	-	30	-	239	-	2	6	-	1	-	-	-	1	20	-	299	-	-	113.33
Seetapore	779	1	-	17	-	46	-	-	2	-	-	-	-	1	-	15	2	84	1.28	2.56	107.83
Etah	206	-	-	-	-	-	-	-	-	-	1	-	-	-	2	1	-	4	-	-	19.42
Humeerpore	133	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	7.52
Oraie	128	-	-	-	-	1	-	-	-	-	-	-	-	1	-	-	1	3	-	7.81	23.44
Futteghur	404	-	-	55	1	3	-	-	2	-	-	1	-	-	-	1	1	64	-	2.48	158.42
Cawnpore	279	-	-	12	-	-	-	-	-	-	-	-	-	-	-	1	-	13	-	-	46.59
Banda	258	3	-	-	1	2	-	1	1	-	1	-	-	-	-	3	-	12	11.63	-	46.51
Nagode	116	-	-	4	-	-	-	-	1	-	-	-	-	-	-	-	-	5	-	-	43.10
Allahabad	2,192	28	-	6	3	28	1	2	5	-	4	-	-	2	-	8	-	87	12.77	-	39.69
	15,450	136	3	147	12	560	1	10	30	-	27	4	2	19	5	81	7	1,044	8.80	45	67.57

3.—GAOLS OF THE BENGAL PRESIDENCY, 1864—continued.

TABLE showing the MORTALITY in each GAOL, the CAUSES of DEATH, and the Ratio of DEATHS to STRENGTH.

STATIONS.	Average Strength.	CAUSES OF DEATH IN HOSPITAL.														Died out of Hospital.	Total Number of Deaths.	DIED PER 1,000 OF AVERAGE STRENGTH.			
		Cholera.	Small-pox.	Fevers.	Apoplexy.	Dysentery & Diarrhoea.	Hepatitis.	Spleen Disease.	Respiratory Disease.	Heart Disease.	Phtiasis Pulmonalis.	Dropsy.	Scurvy.	Atrophy and Anemia.	Wounds and Accidents.			All other Causes.	(A.)	(B.)	(C.)
																			Cholera.	Sudden Deaths out of Hospital.	All Causes.
Raipore	343	23	-	33	-	19	-	-	1	-	-	-	-	4	-	2	82	67.06	-	239.07	
Belaspore	81	3	-	1	-	1	-	-	-	-	-	-	-	-	-	-	5	37.04	-	61.73	
Bandhara	417	-	-	2	-	22	-	-	-	-	-	-	-	-	-	1	28	-	2.40	67.15	
Chanda	170	5	-	1	-	2	-	-	3	-	-	-	-	2	-	2	12	29.41	-	70.59	
Nagpore	559	9	-	4	-	13	-	-	3	-	-	-	1	-	-	2	32	16.10	-	57.25	
Chindwara	100	-	-	-	-	5	-	-	1	-	-	-	-	-	-	1	7	-	-	70.00	
Kowtah	68	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	1	-	-	14.71	
Sironcha	30	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Mundla	59	-	-	2	-	2	-	-	-	-	-	-	-	-	-	-	4	-	-	67.80	
Jubbulpore (Civil)	471	-	-	4	-	4	-	-	3	-	-	-	-	-	-	2	13	-	-	27.60	
Jubbulpore (Thuggee)	565	-	-	-	-	-	-	-	2	-	-	-	-	1	-	1	4*	-	-	-	
Dumoh	207	-	-	-	-	2	-	-	-	-	-	-	-	-	-	1	4	-	-	19.32	
Saugor	348	16	-	-	-	2	-	-	3	-	1	-	-	1	-	-	23	45.98	-	66.09	
Nursingpore	192	-	1	-	-	-	-	-	-	-	-	-	-	-	-	1	2	-	-	10.42	
Lullutpore	259	-	-	-	-	4	-	-	-	-	-	-	-	-	-	1	5	-	3.86	19.30	
Jhansi	298	-	-	-	-	1	-	1	-	-	-	-	-	-	-	1	3	-	-	10.07	
Seonee	268	6	-	5	-	11	-	-	1	-	-	-	-	-	-	1	24	22.39	-	89.55	
Baitool	163	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	2	-	-	12.27	
Schore	95	-	-	-	-	1	-	-	1	-	-	-	-	-	-	-	2	-	-	21.05	
Hosungabad	272	-	-	1	-	4	-	-	1	-	-	-	-	-	-	-	6	-	-	22.06	
Mundlaisir	148	1	-	1	-	2	-	-	-	-	1	-	-	-	-	-	5	6.76	-	33.78	
Ajmere	229	-	-	2	-	11	-	-	1	-	-	-	-	-	-	-	14	-	-	61.14	
Beaur	103	-	-	1	-	1	-	-	-	-	-	-	-	1	1	-	4	-	-	39.42	
	5,448	63	1	57	-	110	-	1	18	-	2	-	1	11	1	15	282	11.56	.36	51.76	
Muttra	243	-	-	3	-	3	-	-	2	-	-	-	-	-	-	-	8	-	-	32.92	
Agra	1,993	-	-	280	2	29	-	-	2	-	1	1	-	17	-	24	358	-	1.00	179.63	
Secundra	257	-	-	66	-	5	-	-	2	-	1	-	-	1	-	1	76	-	-	295.72	
Etawah	183	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	-	-	5.46	
Mynpoorie	340	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	2	-	4.17	8.34	
Allyghur	165	-	-	1	-	-	-	-	-	-	1	-	-	-	-	3	6	-	6.06	36.36	
Bolundshuhur	141	-	-	1	1	-	-	-	-	-	-	-	-	-	-	-	2	-	-	14.18	
Shahjehanpore	258	-	-	3	-	1	-	-	1	-	-	-	-	-	-	1	6	-	-	23.26	
Bareilly	1,449	-	-	6	-	5	-	-	2	-	-	-	-	1	-	5	19	-	-	13.11	
Budaon	212	-	-	4	-	-	-	-	-	-	-	-	-	1	1	-	6	-	-	28.30	
Seharunpore	204	-	-	-	-	1	-	-	1	-	-	-	-	1	-	-	3	-	-	14.61	
Bijnore	230	-	-	-	-	1	-	-	1	-	-	-	-	-	-	1	3	-	-	13.04	
Deyrah	67	-	-	1	-	3	-	-	-	-	-	-	-	-	-	-	4	-	-	59.70	
Almorah	130	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	-	-	7.69	
Mozuffernuggur	97	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	1	-	-	10.31	
Moradabad	357	-	-	10	-	2	1	-	2	-	-	1	-	3	2	2	23	-	-	64.43	
Meerut	1,415	-	-	12	-	14	-	-	7	1	-	-	1	-	1	13	52	-	2.12	36.75	
	7,641	-	-	387	3	65	1	-	20	1	3	2	1	24	5	52	7	-	.92	74.73	
Delhi	299	-	-	24	-	3	-	1	1	-	-	-	-	1	-	1	32	-	3.35	107.02	
Rohtuk	218	-	-	2	-	1	-	-	1	-	-	-	-	-	-	1	5	-	-	22.94	
Hissar	219	-	-	1	-	1	-	-	1	-	-	-	-	-	-	-	3	-	-	13.17	
Sirsa	211	-	-	2	-	1	-	-	-	-	-	-	-	-	1	-	4	-	-	18.96	
Kuraul	48	-	-	2	-	-	-	-	1	-	-	-	-	-	-	1	4	-	-	-	
Umballa	866	1	-	158	5	55	1	-	8	1	1	-	-	24	1	11	266	1.15	-	307.16	
Loodianah	145	-	-	1	-	2	-	-	-	-	-	-	-	-	-	-	3	-	-	20.69	
Jullundur	332	-	-	-	-	1	-	-	-	-	-	-	-	-	-	2	4	-	3.01	12.05	
Perozepore	441	-	-	1	-	1	-	-	-	-	-	-	-	-	-	2	4	-	-	9.07	
Umritsar	554	-	-	51	2	10	-	-	2	1	1	-	-	-	2	8	77	-	-	138.99	
Lahore	1,614	-	-	144	1	10	-	1	8	-	3	1	-	11	2	-	182	-	.61	110.71	
Lahore Female Gaol	168	-	-	8	-	3	-	-	-	-	-	-	-	1	-	2	14	-	-	83.33	
Sealkote	191	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	5.24	
Dhumsalla	137	-	-	-	-	1	-	-	1	-	1	-	-	-	-	1	4	-	-	29.20	
Goordaspore	295	-	-	4	-	-	-	-	-	-	-	-	-	-	-	3	7	-	-	23.73	
Gojranwalla	330	-	-	26	-	21	-	1	2	1	1	-	-	-	-	5	57	-	-	172.73	
Gojrat	264	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	1	-	-	3.79	
Shahpore	239	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	4.18	
Jhelum	220	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	1	-	-	4.55	
Gojaira	315	-	-	2	-	1	-	-	3	-	-	-	-	2	-	1	9	-	-	28.57	
Mooltan	653	-	-	52	-	11	-	-	1	-	-	-	-	3	1	4	73	-	1.53	111.79	
Jhung	268	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Dera Ghazee Khan	42	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Dera Ismael Khan	255	-	-	-	-	1	-	-	1	-	-	-	-	-	-	1	3	-	-	11.76	
Kohat	113	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	1	-	-	8.85	
Bunnoo	91	-	-	2	1	-	-	-	-	-	-	-	-	-	-	3	3	-	-	32.97	
Rawul Pindie	763	-	-	37	-	10	-	-	3	-	1	-	-	4	-	-	58	-	-	76.02	
Peshawur	308	-	-	-	-	5	-	-	-	-	-	-	2	-	1	1	9	-	-	29.22	
	9,630	1	-	518	9	139	1	3	34	3	8	1	2	46	8	48	826	.10	.52	85.77	
BENGAL PRESIDENCY	52,598	450	10	1163	33	1264	10	21	149	11	90	52	6	141	25	236	3,692	8.56	.59	70.19	

* Not including men who died who were not under treatment in Hospital.

4.—SUMMARY FOR 1864.

DETAIL of ADMISSIONS and DEATHS of EUROPEAN SOLDIERS, and WOMEN and CHILDREN of EUROPEAN REGIMENTS, the NATIVE ARMY, and the GAOL POPULATION of the *Bengal* PRESIDENCY.

CAUSES OF ADMISSIONS AND DEATHS.	ADMITTED INTO HOSPITAL, AND DIED IN AND OUT OF HOSPITAL.									
	EUROPEANS.						NATIVES.			
	Soldiers.		Women.		Children.		Native Army.		Prisoners.	
	Average strength 40,385	Average strength 2,700	Average strength 2,700	Average strength 2,700	Average strength 4,120	Average strength 4,120	Average strength 37,225	Average strength 37,225	Average strength 52,598	Average strength 52,598
	Admitted - - 66,842	Admitted - - 3,084	Admitted - - 3,084	Admitted - - 3,084	Admitted - - 3,481	Admitted - - 3,481	Admitted - - 52,006	Admitted - - 52,006	Admitted - - 64,392	Admitted - - 64,392
	Died - - - 852	Died - - - 102	Died - - - 102	Died - - - 102	Died - - - 294	Died - - - 294	Died - - - 489	Died - - - 489	Died - - - 3,692	Died - - - 3,692
	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.
Variola et Varioloides - -	94	14	9	1	12	3	50	11	576	10
Varicella - - - -	4	-	1	-	9	1	5	-	383	-
Scarlatina - - - -	-	-	1	1	1	-	1	-	-	-
Morbilli - - - -	16	-	3	-	176	18	17	-	27	-
Pertussis - - - -	-	-	-	-	19	4	-	-	-	-
Diphtheria - - - -	-	-	-	-	2	1	-	-	-	-
Tonsillitis - - - -	717	-	26	-	23	-	77	-	52	1
Cynanche Trachealis - -	-	-	-	-	13	6	-	-	-	-
Parotitis - - - -	32	-	1	-	4	-	54	-	69	3
Febris Intermittens - -	17,492	41	627	6	617	11	25,254	83	21,878	358
" Remittens - - -	1,702	52	91	7	83	9	647	51	3,138	497
" Continua - - -	2,782	34	140	2	158	4	126	8	2,055	292
Ophthalmia - - - -	1,757	-	254	-	858	-	1,023	-	1,065	13
Erysipelas - - - -	70	1	7	-	-	-	19	1	67	17
Erythema - - - -	16	-	-	-	-	-	9	-	3	-
Anthrax - - - -	9	1	1	-	-	-	13	1	46	2
Furunculus - - - -	577	-	-	-	12	-	196	-	88	-
Pyæmia - - - -	-	-	-	-	-	-	-	-	1	1
Gangroena - - - -	-	-	-	-	-	-	2	2	18	5
Phagedæna - - - -	-	-	-	-	-	-	1	1	-	-
Cancrum Oris - - - -	-	-	-	-	1	1	-	-	-	-
Influenza - - - -	151	-	2	-	3	-	116	-	38	-
Dysenteria Acuta - - -	1,212	55	-	-	106	14	2,745	43	5,642	669
" Chronica - - -	233	11	104	8	-	-	-	-	-	-
Diarrhœa - - - -	4,020	27	270	15	590	67	2,247	44	6,013	595
Cholera (and Choleraic Di-	-	-	-	-	-	-	-	-	-	-
arrhœa) - - - -	175	103	31	19	22	18	143	63	1,211	450
Rheumatismus - - - -	2,963	3	43	-	6	-	1,932	3	1,408	14
Syphilis Primaria - - -	3,532	-	-	-	-	-	713	-	500	1
" Secundaria - - -	1,290	10	4	-	3	-	263	1	197	5
Iritis Syphilitica - - -	49	-	-	-	-	-	7	-	6	-
Gonorrhœa - - - -	3,492	-	-	-	1	-	361	-	123	-
Balanitis - - - -	11	-	-	-	-	-	2	-	153	1
Bubo - - - -	1,446	-	-	-	-	-	380	-	45	1
Orchitis - - - -	256	-	-	-	-	-	101	-	48	-
Phymosis - - - -	53	-	-	-	-	-	19	-	-	-
Verrucæ - - - -	40	-	-	-	-	-	-	-	-	-
Condyloma - - - -	18	-	-	-	-	-	2	-	103	6
Leprosy - - - -	-	-	-	-	-	-	-	-	1	1
Hydrophobia - - - -	3	3	-	-	-	-	2	2	18	-
Elephantiasis - - - -	-	-	-	-	-	-	-	-	158	6
Scorbutus et purpura - -	37	2	-	-	1	-	39	1	10	-
Ebriositas - - - -	479	4	8	1	-	-	7	-	16	-
Bronchocele - - - -	-	-	-	-	-	-	8	-	20	-
Aphthæ - - - -	5	-	-	-	5	-	6	-	1	-
Porrigi - - - -	10	-	-	-	1	-	8	-	37	-
Scabies - - - -	73	-	-	-	7	-	880	-	7	5
Verres - - - -	40	-	1	-	5	-	21	-	1	-
" Tænia - - - -	249	-	3	-	18	-	3	-	132	-
" Dracunculus - - -	1	-	-	-	-	-	33	-	180	25
Anæmia - - - -	155	2	136	1	83	8	40	-	157	37
Anasarca - - - -	27	1	3	-	-	-	17	5	7	5
Scirrhomia - - - -	4	2	4	-	-	-	1	1	-	-
Podagra - - - -	4	-	-	-	-	-	-	-	1	-
Lupus - - - -	10	-	-	-	-	-	-	-	39	4
Scrofula - - - -	86	1	1	-	7	-	11	1	63	2
Tabes Mesenterica - - -	-	-	-	-	9	8	-	-	152	88
Phthisis Pulmonalis - -	339	64	14	10	3	1	35	20	63	2
Hæmoptysis - - - -	91	1	-	-	-	-	12	-	3	1
Morbus Coxæ - - - -	1	-	-	-	-	-	-	-	2	2
Abscessus Psoanus - - -	2	2	-	-	-	-	-	-	1	1
Meningitis - - - -	10	4	-	-	5	5	-	-	2	2
Myelitis - - - -	1	-	-	-	-	-	-	-	1	1
Encephalitis - - - -	1	2	-	-	-	-	-	-	2	3
Hydrocephalus - - - -	-	-	-	-	12	7	-	-	-	-
Apoplexia et insolutio -	102	67	5	3	1	-	10	6	52	38
Paralysis - - - -	89	12	4	-	-	-	26	2	48	10
Mania - - - -	42	-	2	1	-	-	29	-	266	9
Melancholia - - - -	5	-	-	-	-	-	-	-	15	2
Dementia - - - -	84	1	-	-	-	-	3	-	5	-
Chorea - - - -	4	-	-	-	-	-	-	-	5	-
Hysteria - - - -	-	-	15	-	2	-	-	-	5	-
Convulsio - - - -	-	-	-	-	41	29	-	-	-	-
Epilepsia - - - -	148	6	2	1	-	-	22	-	90	6
Tetanus - - - -	1	1	-	-	-	-	2	2	8	4

Note.—The words and figures printed in *italics* were printed in red in the original.

4.—SUMMARY FOR 1864—continued.

DETAIL of Admissions and Deaths of European Soldiers, &c., of the Bengal Presidency—continued.

CAUSES OF ADMISSIONS AND DEATHS.	ADMITTED INTO HOSPITAL, AND DIED IN AND OUT OF HOSPITAL.									
	EUROPEANS.						NATIVES.			
	Soldiers.		Women.		Children.		Native Army.		Prisoners.	
	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.
Delirium Tremens	144	16	2	1	-	-	6	-	4	-
Cephalæa	398	-	6	-	-	-	54	-	114	-
Dysœcœa	21	-	-	-	-	-	6	-	1	-
Neuralgia	214	-	12	-	-	-	73	-	76	-
Odontalgia	6	-	-	-	-	-	15	-	68	-
Otitis	339	-	4	-	5	-	231	-	191	-
Amaurosis	11	-	-	-	-	-	3	-	17	-
Nyctalopia	-	-	-	-	-	-	8	-	-	-
Pericarditis	28	2	-	1	-	-	3	1	8	4
Morbus Cordis	252	26	4	2	-	-	7	5	10	12
Palpitatio	41	-	-	-	-	-	1	-	-	-
Aneurisma	18	14	1	-	-	-	1	3	2	1
Angina Pectoris	29	-	-	-	-	-	-	-	-	-
Syncope	13	-	1	-	-	-	1	-	-	-
Varix	30	-	-	-	-	-	2	-	-	-
Epistaxis	18	-	-	-	-	-	5	-	12	1
Phlebitis	1	-	-	-	-	-	-	-	6	-
Laryngitis	16	1	1	-	4	1	7	1	14	3
Bronchitis	2,032	19	30	1	88	11	809	27	877	40
Pleuritis	164	4	6	-	2	-	127	7	248	8
Pneumonia	125	17	-	-	9	6	162	30	291	83
Asthma	38	1	2	-	1	-	93	3	190	13
Stomatitis	12	-	3	-	-	-	22	1	45	1
Gastritis	35	2	7	1	-	-	-	-	11	3
Enteritis	15	5	2	1	2	1	8	1	12	4
Peritonitis	27	10	-	-	1	-	5	2	12	7
Obstipatio	160	-	9	-	4	-	71	-	560	2
Ileus	-	-	-	-	-	-	3	2	1	1
Hernia	39	1	-	-	2	-	23	1	19	1
Dyspepsia	1,125	2	171	-	16	-	373	1	673	3
Colica	638	-	50	-	6	-	622	-	1,335	5
Hæmatemesis	13	2	-	-	-	-	9	-	5	1
Melæna	-	-	-	-	-	-	-	-	4	-
Hæmorrhoids	406	-	8	-	2	-	116	-	165	-
Fistula in Ano	55	-	-	-	2	-	19	-	22	-
Splenitis	417	2	14	-	4	-	250	5	324	20
Hepatitis Acuta	1,297	49	62	5	6	2	64	4	78	10
" Chronica	1,081	70	-	-	-	-	-	-	-	-
Cirrhosis	-	1	-	-	-	-	-	-	1	1
Icterus	220	3	4	-	4	-	78	2	120	22
Ascites	9	1	1	-	-	-	3	1	32	15
Nephritis	56	3	5	-	-	-	32	1	54	38
Hæmaturia	9	-	-	-	-	-	3	-	8	1
Ischuria	25	1	-	-	1	-	4	-	11	1
Diuresis	12	-	-	-	-	-	1	-	3	-
Eneuresis	9	-	-	-	-	-	2	-	-	-
Cystitis	14	-	-	-	-	-	6	1	4	-
Calculus Vesicæ	3	-	-	-	1	-	-	-	9	1
Stricture Urethræ	135	1	-	-	-	-	16	-	29	2
Fistula in Perineo	8	-	-	-	1	-	1	-	-	3
Phymosis	-	-	-	-	1	-	-	-	-	-
Varicocele	6	-	-	-	-	-	2	-	5	-
Orchitis	751	-	-	-	-	-	113	-	73	-
Hydrocele	27	-	-	-	-	-	18	-	54	-
Ovaritis	-	-	2	-	-	-	-	-	-	-
Hysteritis	-	-	1	1	-	-	-	-	4	-
Polypus Uteri	-	-	6	-	-	-	-	-	-	-
Leucorrhœa	-	-	7	-	1	-	-	-	-	-
Lumbago	95	-	-	-	-	-	146	-	70	-
Pleurodynia	20	-	-	-	-	-	5	-	11	-
Arthritis	34	-	-	-	-	-	6	-	5	-
Synovitis	93	-	-	-	2	-	8	-	40	-
Contractura	6	-	-	-	-	-	-	-	-	-
Periostitis	118	-	-	-	-	-	7	-	6	-
Exostosis	8	-	-	-	-	-	4	-	-	-
Caries	6	-	-	-	-	-	5	-	10	-
Necrosis	15	-	-	-	-	-	8	1	6	-
Phlegmon and Abscess	2,110	1	52	-	53	-	2,535	4	4,175	10
Whitlow	178	-	-	-	-	-	67	-	131	-
Ulcer	2,371	-	19	-	20	-	3,287	2	3,021	29
Skin Diseases	394	-	2	-	17	-	501	-	515	-
Tumour	27	-	2	-	-	-	16	-	12	-
Dentition	-	-	-	-	178	34	-	-	-	-
Hæmelip	-	-	-	-	1	-	-	-	-	-
Childbirth	-	-	526	8	-	-	-	-	59	3
Abortion	-	-	41	1	-	-	-	-	10	-
Diseases of Menstruation	-	-	53	1	2	-	-	-	12	1
Atrophy and Debility	356	12	89	2	73	15	334	7	391	113
Burning and Explosion	88	5	-	-	-	-	-	-	74	1
Asphyxia	-	1	-	-	-	-	-	-	-	-

4.—SUMMARY FOR 1864—continued.

DETAIL of Admissions and Deaths of European Soldiers, &c., of the *Bengal* Presidency—continued.

CAUSES OF ADMISSIONS AND DEATHS.	ADMITTED INTO HOSPITAL, AND DIED IN AND OUT OF HOSPITAL.									
	EUROPEANS.						NATIVES.			
	Soldiers.		Women.		Children.		Native Army.		Prisoners.	
	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.	Admitted.	Died.
Dislocation - - -	51	22	62	-	54	1	3,630	8	15	-
Subluxation - - -	758								33	-
Fracture - - -	177								184	10
Contusion - - -	2,526								1,400	12
Concussion of Brain - - -	12								1	1
Amputation - - -	13	3	-	-	-	-	145	2	235	3
Incised Wound - - -	349								13	-
Gunshot wound - - -	50								7	2
Killed in action - - -	-								-	-
Poisoning - - -	2								-	-
Snake bite - - -	-	1	-	-	-	-	5	-	-	-
Struck by Lightning - - -	2	-	-	-	-	-	4	1	-	-
Drowned - - -	-	13	-	-	-	-	-	5	-	4
Suicide - - -	-	12	-	-	-	-	3	4	-	8
Homicide - - -	-	1	-	-	-	-	-	2	-	2
Punished - - -	48	-	-	-	-	-	-	-	-	-
Disease not specified - -	76	1	4	-	-	-	72	-	-	-

RATIOS of ADMISSIONS and DEATHS.

CAUSES OF ADMISSIONS AND DEATHS.	ADMITTED PER CENT. OF THE AVERAGE STRENGTH.					DIED PER 1,000 OF THE AVERAGE STRENGTH.				
	EUROPEANS.			NATIVES.		EUROPEANS.			NATIVES.	
	Soldiers.	Women.	Children.	Native Army.	Prisoners.	Soldiers.	Women.	Children.	Native Army.	Prisoners.
Cholera - - -	·37	1·15	·54	·38	2·29	2·53	7·04	4·37	1·67	8·56
Small-pox - - -	·22	·33	-	·12	1·09	·33	·37	-	·30	·19
Eruptive Diseases of Children	-	-	4·81	-	-	-	-	5·34	-	-
Throat Diseases of Children	-	-	1·45	-	-	-	-	2·67	-	-
Fevers, Intermittent -	43·46	31·78	20·83	69·38	51·43	3·14	5·56	8·25	3·84	22·11
Fevers, Remittent and Continued - - -	10·77									
Apoplexy - - -	·22									
Head Affections of Children	-									
Delirium Tremens - - -	·36									
Dysentery - - -	3·57	13·85	16·89	13·72	22·16	2·30	8·52	19·66	2·29	24·03
Diarrhœa - - -	9·82									
Hepatitis - - -	5·63									
Spleen Disease - - -	1·01									
Respiratory Diseases - -	7·96									
Heart Diseases - - -	-	·19	-	-	-	·99	1·11	-	·24	-
Phthisis Pulmonalis - -	·79	·52	-	·09	·29	1·61	3·70	-	·54	1·71
Scrofulous Affections of Children - - -	-	-	·46	-	-	-	-	1·70	-	-
Dropsy - - -	-	-	-	-	·36	-	-	-	·13	·99
Atrophy and Anæmia - -	-	8·33	3·79	-	1·07	-	1·11	5·58	·18	2·68
Scurvy - - -	·09	-	-	·09	·30	·05	-	-	·03	·11
Rheumatism - - -	8·41	1·59	-	5·67	2·81	-	-	-	-	-
Venereal Diseases - - -	25·49	-	-	4·94	2·09	-	-	-	-	-
Eye Diseases - - -	4·29	9·41	20·83	2·62	2·05	-	-	-	-	-
Diseases special to Women	-	2·63	-	-	-	-	·74	-	-	-
Childbirth and Abortion -	-	21·00	-	-	-	-	3·34	-	-	-
Dentition - - -	-	-	4·32	-	-	-	-	8·25	-	-
Abscess and Ulcer - - -	13·04	2·63	1·77	14·94	14·04	-	-	-	-	-
Wounds and Accidents - -	10·51	2·30	1·31	11·98	3·72	·40	-	·24	·29	·48
All other Causes - - -	18·15	14·59	3·38	10·41	15·13	2·36	2·96	·49	1·05	4·69
Died out of Hospital - -	-	-	-	-	-	1·29	-	-	·38	·59
All Causes - - -	164·16	114·23	84·49	138·87	122·73	21·10	37·78	71·36	13·13	70·19

DISTRIBUTION of the EUROPEAN ARMY of the BENGAL PRESIDENCY
on 1st July 1864.

Strength of the Army on 1st July 1864, 40,458.

ARTILLERY :			Station.	Strength.	INFANTRY :			Station.	Strength.
Artillery Regimental Band - - -			Meerut - - -	40	H.M.'s 7th Fusiliers - - -			Ferozepore - - -	861
C. Royal Horse Brigade A. Battery -			Morar - - -	138	18th Regiment - - -			Jullundur - - -	812
B. " -			Benares - - -	131	20th " - - -			Roorkee - - -	458
C. " -			Meerut - - -	137	" " - - -			Futtehghur - - -	383
D. " -			Meerut - - -	135	23d " - - -			Agra - - -	849
E. " -			Rawulpindee - - -	143	27th " - - -			Dinapore - - -	839
F. " -			Lucknow - - -	141	34th " - - -			Seetapore - - -	418
					" " - - -			Rae Bareilly - - -	330
F. Royal Horse Brigade A. Battery -			Umballa - - -	133	35th " - - -			Fyzabad - - -	832
B. " -			Peshawur - - -	144	36th " - - -			Lucknow - - -	842
C. " -			Umballa - - -	131	38th " - - -			Delhi - - -	764
D. " -			Peshawur - - -	134	42d " - - -			Dugshaie - - -	801
E. " -			Mean Meer - - -	141	46th " - - -			Shahjehanpore - - -	557
F. " -			Sealkote - - -	128	" " - - -			Moradabad - - -	342
11th Brigade Royal Artillery A. Battery			Fyzabad - - -	145	48th " - - -			Dum-Dum - - -	606
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RESOLUTION of the Governor General of India in Council, dated
15th December 1865.

THE Right Honourable the Governor General in Council has perused this the First Annual Report of the Commission with much interest and satisfaction, and values greatly the practical and judicious remarks and suggestions on many sanitary questions which it contains. He desires to congratulate the President and Members on having so successfully commenced the important duties entrusted to them.

2. His Excellency in Council has observed with gratification from Dr. Bryden's Statistical Returns that the death rate of European soldiers in this Presidency has been for a series of years gradually decreasing; so that not only is the high rate* of mortality in India quoted by the Royal Sanitary Commission now a thing of the past, but the sanguine expectations indulged last year of the further reduction of the rate, to that which obtained amongst the troops in England before the recent sanitary improvements had been introduced, have been more than realised during the past year.

3. Whilst aware that this improvement must be attributed in part to the altered constitution of the army, the short periods of service, and different conditions of invaliding, the Governor General in Council quite agrees in the opinions expressed by the President as to the great advantages that must result from every improvement in the local sanitary condition of the European force serving in India. He therefore deprecates any relaxation of vigilance over the sanitary arrangements now in force; and he is prepared to give ready support to any of the Commission's suggestions in that direction whenever it can be shown that they are practicable, and that the arrangements for carrying them out are complete.

4. The climatic influences to which the Commission refer must necessarily, his Excellency in Council observes, be borne in mind in carrying out much of what is proposed to be done for sanitary purposes in India; and it must not be forgotten that the measures so successfully employed to reduce mortality in England do not so directly influence those causes of sickness which are peculiar to a tropical country.

5. Some of the measures commenced or contemplated seem to his Excellency in Council deserving of a few remarks.

6. It has been determined that barracks and hospitals shall be double-storeyed; and this, it is hoped, will render the men less liable to the fevers so frequent in this country and so injurious in their effects.

7. Experiments are also being made with the view of discovering the best method of cooling the air in barracks during the long days in the hot weather and rains, and of renewing the stagnant air at night; and, if these are successful, much more relief from the heat that punkahs can secure will be afforded to the men, who will also be able to sleep in greater comfort, breathing a purer atmosphere. The necessity of putting sufficiently thick roofs on the upper storeys of the barracks to lessen the heat so often complained of will not be overlooked.

8. The increased barrack accommodation which it has been determined to provide in the hills, for both regiments and convalescent depôts, as soon as the stations and sites can be selected, will also, there can be no doubt, have a beneficial effect on the health of the European force.

9. Nor should the successful operation of the rules laid down for dealing with epidemic cholera, &c., be overlooked. Experience leads to the conclusion that by attention to them epidemic outbreaks may be most successfully combated; and measures similar to those they prescribe have proved of essential service on several occasions of outbreaks of typhoid fever in some of the gaoles in the North-western Provinces and the Punjaub.

10. The success which has already attended the measures adopted in some stations for checking the spread of venereal disease amongst the European soldiers

69 per 1,000
men annually.

soldiers is also worthy of notice, as warranting an extension of the system to the other stations of the army; due attention being paid to local circumstances and local prejudices.

11. The analysis of the water which it has been proposed to make at the different stations of the army is another question which will deserve attentive consideration, and the importance of which has recently been indicated by the discovery, in the water of the wells in several of the principal cities in Upper India, of much organic matter, the presence of which must seriously endanger the health of the community at all times, especially during the prevalence of epidemic disease. The importance of unremitting watchfulness and care to preserve the drinking water in a state of purity, in a country in which the wells are so exposed to contamination, owing to the habits of the people, can scarcely be overrated.

12. The Governor General in Council concurs generally in the remarks of Dr. Gordon, which the Commission have adopted, relative to the necessity of consulting the instincts and tastes of the men in the diet which is supplied to or made available for them. Fortunately, in India the prices of the supplementary articles he may crave are so low that it is in the power of every soldier to gratify his peculiar tastes by purchasing them. His Excellency in Council is satisfied of the justice of the Commission's remark that "when the orders issued by Government during the past year have been completely carried into effect, hardly anything will remain to be done," which Government could with propriety do, "for the improvement of the diet of the troops." For clearly exceptional circumstances rules would be unsuited; they must be considered and specially provided for as they arise.

13. With reference to that portion of the Report which relates to the civil population, the Governor General in Council observes that the attention of the Commission has been and should continue to be directed to effecting, in direct communication with the civil officers, an improvement in the sanitary condition of the cities and larger villages, especially of those in the neighbourhood of civil and military stations; and it appears to his Excellency in Council that, by diffusing amongst the people information on the character and progress of contagious diseases, the Commission might aid considerably the measures of prevention which the people might themselves desire to take in accordance with their customs and circumstances, by guiding them in the right direction.

14. The health of the prisoners in gaols, amongst whom the mortality is far greater than it should be, has, the Governor General in Council remarks, very properly engaged the attention of the Commission. The result of the experimental increase in the food of this class, which has lately been made in the Punjab, should be carefully noted; as, whilst the diet should not be such as to render a residence in gaol desirable, it should be sufficient to fit the prisoner to resist the depressing influences of confinement and to bear well the labour now generally enforced in all gaols.

15. The standard quantity of food should depend on the amount usually consumed by the inhabitants of the district whence the prisoners come, and the variety determined by the known effect of the changes necessary for the maintenance of health. And, as the diet of no particular province can be held to be applicable to the whole country, the numerous nationalities and varying climates of India requiring very different amounts and constituents of food, information as to the food of the people, which is as yet but imperfectly before Government, should be diligently sought for.

16. The Governor General in Council deeply regrets that so high a rate of mortality from epidemic fever should have occurred in some of the gaols in the North-western Provinces and Punjab; for the very necessities of punishment, which require that criminals should be congregated in considerable numbers in one place, and which thus offer, so to speak, facilities for the spread of contagious disease, render possible a far more effective control over their sanitary condition than could be exerted over that of a community of free men. The entrance of epidemic disease into a gaol may be often prevented; and its existence there should at any rate be almost at once recognised by the medical officer, when means should be immediately adopted for removing the prisoners from the infected

gaol, in such a way as to avoid the communication of the disease to the villagers, and through them to any neighbouring cantonments, or for separating the healthy from those affected.

17. The success of these measures depends entirely on the promptness and efficiency of the arrangements made by the local officers; and the Sanitary Commission will, His Excellency in Council has no doubt, aid Government in seeing that no exertions are spared to prevent in future the occurrence of a high rate of mortality from epidemics in gaols.

18. The Report adverts to the sanitary condition of Calcutta, which has grown so rapidly into an immense city without sufficient care being taken to secure cleanliness and proper ventilation. Some good has already been done and energy been infused into existing machinery; but very much more remains to be done to render the city healthy, and this question still demands the most earnest attention of the Commission. An accurate registration of deaths, which would point out the localities most defective in sanitary arrangements, is, His Excellency in Council remarks, still much needed.

19. The great difficulty to be surmounted in effecting sanitary improvement is, doubtless, the apathy and want of interest in the subject of the people generally. But the diffusion, by lectures and other means, of a knowledge of the benefits of general cleanliness, and of the conditions of public health, will, it may be hoped, reach in time the better educated portion of the people at any rate, and secure their willing and active co-operation in the measures necessary for the prevention of disease and for securing the enjoyment of a higher state of health both to individuals and to the community generally.

R E P O R T

OF THE

SANITARY COMMISSION FOR BOMBAY

1 8 6 5.

(PRESENTED TO PARLIAMENT BY HER MAJESTY'S COMMAND.)

Ordered, by The House of Commons, to be Printed,
10 August 1866.

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R E P O R T

OF THE

SANITARY COMMISSION FOR BOMBAY,

FOR THE YEAR 1865.

THE most important sanitary measure that was adopted during the year, was relieving the soldiers from overcrowding in their barracks. Early in the year the Government of India ordered that temporary accommodation should be provided, "whatever the cost may be," to make up to each man the full standard floor superficies of 90 feet. It was ordered that all rooms occupied as libraries, canteens, or for other auxiliary purposes, and which could be made available to supply deficiencies in barrack space, should be appropriated to this use, whatever the inconvenience might be, as it seemed essential that the sleeping rooms of the men should not be overcrowded.

It was found that in this Presidency, after the misappropriated barrack-rooms had been restored to their original use as dormitories, there still was only a floor superficies of 78 feet for each unmarried man of the actual present strength of the army, and that there remained 1,389 single men for whom barracks had to be provided.

As the erection of the temporary buildings would necessarily occupy some time, tents were pitched as dormitories at some stations where the ground was not unfavourable, but it was enjoined that they should not be used for that purpose where the soil was damp, lest more injury should be done to health than would accrue from a little longer continuance of the former degree of overcrowding.

Tents as dormitories.

With a view to prevent the excessive occupation of barrack-rooms and hurtful irregularity in the distribution of the men, it was ordered that on each room there should be inscribed the number of men it could legitimately contain.

Much was done in the preparation and inspection of plans and estimates for increasing and improving the permanent accommodation of the troops, and standard plans of guard-rooms and many other subsidiary buildings were issued by Government for the guidance of the executive officers in the Department of Public Works.

Plans of permanent barracks.

The subject of hospital construction was under consideration, and plans were prepared by Lieutenant Colonel Crommelin, which, with some modifications, that were approved of by the Government of Bombay, have been adopted for guidance, pending the decision of the authority in England. These plans allow the liberal floor superficies of 130 feet in the dormitories, and afford separate day rooms.

Plans for Hospitals.

It was ordered that temporary buildings should be raised to complete at once the hospital accommodation to 12 per cent. of strength where it fell short of that, and at the rate of 100 square feet a cot, which in the present exigency was to be considered enough.

Temporary hospital accommodation.

Measures for the ventilation and the cooling of barracks were under consideration, and Government called for reports on schemes that had been suggested to it by persons not in India. Punkahs and watered tuttee were sanctioned for barracks, family quarters, and hospitals, at several inland stations where they had not before been used.

Ventilation of barracks.

Means of recreation. The sanction of the Secretary of State was given to a large extension of the means of recreation to the soldiers. (*See Appendix.*)

Encroachments in bazars. The evils resulting from irregular occupancy in military bazars and lines, and from buildings being allowed to encroach on the ground that originally intervened between the barracks and the bazar, were under the consideration of Government. It was also seen to be objectionable that a bazar should intervene between the barracks and any near neighbouring village or town, because the neutral interval that should be maintained between them was thus in some measure bridged over, and the isolation of the barracks being lost, the inhabitants of the cantonment and the troops were exposed to the risk of participation in any epidemic sickness that there might be among the population of the town.

Orders were issued to prevent the repetition of such irregularities, and to resume, as opportunity offered, the ground that had been improperly built on. In several instances, bazars, that were in noxious proximity to barracks, were removed at the expense to Government of compensation to the owners of the houses.

Disposal of sewage. The abolition of cess-pits was kept in view. Those that were found still existing in connection with the latrines of European corps were at once suppressed, as with the daily cleansing of the latrines that had for years been established, the use of dry earth as an absorbent, even without any special apparatus, was all that was required on account of the liquid excreta that the imperfect construction of the privies allowed to be offensive.

It was thought that a modification of Macfarlane's troughs would be best suited for natives, and some of these were applied for and are expected from England for trial.

It is intended to substitute a tank-cart for the old cook-house masonry cess-pit. The waste water of the lavatories and bath-rooms, it is hoped, will in many cases be utilised in gardens; but where this cannot be effected, it is proposed to conduct it to a distance by pipe.

Gardens near barracks. It was acknowledged that it would be well that there should be no gardens near to barracks, but as they afforded amusement and occupation when close at hand, which the soldier would not seek from them were they at a distance, they were tolerated; but Government ruled that a hard dry surface should be reserved between the garden plots and the barracks or family quarters.

Contour plans of cantonments. Measures for obtaining contour plans of military cantonments were under the consideration of Government, and the survey, with this object, of one station was ordered.

Analysis of waters. The chemical examination of the drinking water used by the troops was continued. A minute quantitative analysis was made of 15 samples from six different stations; and 22 samples from other sources were subjected to the summary analysis, which has been mentioned on former occasions, and from which is learnt the total amount of solid impurities, and the proportion in which recent organic matter is present in water. All the analyses were made by an expert chemist, who is now the official analyser to Government. The waters from the wells of the Dukhun stations contained only from 0.14 to 0.98 grains of recent organic matter in a gallon. The entire solid impurities, however, were great, as might have been expected from the wells being sunk in rock, which, although igneous, contained minerals that did not offer much resistance to the action of water. The rock is dolerite, and many of its beds are amygdaloidal. The mineral impurities in the water, drawn when they were at their maximum, varied in different wells from 20.04 to 29.90 grains; soda, lime, and magnesia were the chief bases, and silica was abundant.

At Kurachee, the organic impurity did not exceed 0.66 grains in the gallon, but the saline impurities in the wells which supplied the troops were from 47 to 61 grains, and consisted chiefly of chloride of sodium.

The water from a well in the granite rock at Aboo, in a total of 10.64 grains of solid impurities, contained 0.59 of organic matter.

Water supply. The wells in the sandy soil of Deesa gave water that contained from 1.44 to 2.34 grains of organic impurities, besides from 2.80 to 3.26 grains of nitrates, the total solid impurities ranging from 24.86 to 36.75 grains in a gallon. This result was not unexpected, as the wells were near habitations. In the alluvial soil

soil at Baroda, the wells, which there also are near habitations, gave water that yielded unsatisfactory results.

Government ordered the circulation of a memorandum to guide officers of the Public Works Department as to the distance that should be maintained between wells for drinking water and habitations.

A comprehensive scheme, to afford an abundant supply of water to the town and cantonment of Poona and the cantonment of Kirkee, was under the consideration of Government. In connection with this, a report on the present state of the water supply was called for. (Appendix.)

The bedding of soldiers in barracks and in hospital was the subject of report, and it is still under the consideration of the Government of India. There appeared to be good reason for continuing the felt mattress in barracks, and for adopting *coir* (cocoanut fibre) as the material for filling hospital beds in cantonment. Bedding in barracks and hospitals.

There were some stations of the army at which the troops had often suffered from scurvy, owing to the deficiency of fresh vegetables. The Rajpootana stations were of the number, but at Aden the disease had been most constant and most severe, especially among the native troops and followers. Efforts were made to ensure a better supply of wholesome vegetables to the European soldiers. Government ordered to the native troops at Aden, as a part of their rations, the issue of Kokum, an acid condiment, along with currystuff. The grain-eating inhabitants of India and the neighbouring countries habitually use an acid condiment as an ingredient of their diet, but it had not hitherto been supplied either to troops in the field, or at stations where they obtained their food from the Commissariat. Kokum is much used in Bombay and in the neighbouring districts. It is the dried fleshy part of the fruit of the *garcinia purpurea*, and its acidity is due to malic acid, which is isomeric with citric acid, and like it has antiscorbutic virtue. The chemical analyser to Government, in communicating the result of his examination of a sample of the substance submitted to him, stated that the air-dried fruit contained 17.26 per cent. of vegetable acid, that the chief cause of the acidity was malic acid, and although there was also some tartaric acid, the quantity of it was small. Vegetables for European troops.

The use of kneading machines in the bakeries supplying the troops with bread, were being brought into general use. The number of stations to which they had been distributed amounted to 18. Rations for Native troops.

The return of native troops from China in overcrowded vessels rendered it necessary to revise the rules regarding accommodation in transports. The space that was in future to be given to native troops and followers was determined. Kneading machines.

The condition of the houses which European officers serving with regiments had to occupy, was the subject of inquiry and report. The result of the investigation showed that the officers were, comparatively, worse provided with accommodation than the non-commissioned officers and men now were under the new regulations as to quarters. The house property in cantonments had come into the possession of native owners, who charged exorbitant rents, and failed to maintain the dwellings in good repair and in a wholesome condition. The resumption of the ground on which officers' quarters stood, was, with a view to providing better buildings, under the consideration of Government, and it was ordered that in the meanwhile quarters on approved plans should be provided at Colaba and Bombay. Transports for native troops.

Before the close of the year a monthly return was received from each cantonment, showing the deaths of the population not embraced in the returns rendered by medical officers. As the period during which those cantonment returns were furnished in proper form was but short, no useful result could as yet be drawn from them. Accommodation for officers.

The great loss of life that was caused by the prevalence of cholera, drew particular attention to the means of lessening its ravages, and, among other measures, the regulations which restricted the marching of troops in some districts to certain seasons, but which of late years had in practice been relaxed, were rendered more stringent. Cantonment deaths returns.

Orders were issued by Government as to the disposal or the disinfection of clothing and tents that had been used by those suffering from cholera. Marching of troops.

- Biers for funerals.** With a view to obviate the risk of infection to which men might be exposed by carrying the coffin of a comrade or other person, on their shoulders to the grave, it was directed that biers should be used by the carrying party at all military funerals.
- Diffusion of cholera by pilgrims.** The danger of the diffusion of cholera by pilgrims and by persons frequenting fairs continued to have the attention of Government, and arrangements were made to prevent, if possible, the outbreak of the disease during the concourse, and to lessen the risks of its being disseminated by the pilgrims on their dispersion. Several of the places of pilgrimage were inspected and reported on. (Appendix.)
- Inspection of places of pilgrimage.**
- Condition of towns.** The health of the civil population generally was the subject of much solicitude. Reports on the condition of several large towns were received by Government (Appendix), and the exertions of magistrates were directed to the improvement of the state of the towns and villages in their several collectorates, and, among other things, to suppress the domiciliary interment of infants, and as far as practicable all intramural burials.
- Domiciliary and intramural burial.**
- Laying out new villages.** Government ordered the circulation of a memorandum on the principles that should be observed in laying out new villages at railway stations or elsewhere.
- Registration civil population.** The registration of the deaths among the civil population, which was begun in 1864, was carried out in nearly all the districts that are in British territory, and arrangements were made that it should be yet more complete in the following year. The population returns were prepared in 1851, and it is presumed that the movement of the population in some parts of this Presidency have been so considerable, as to render the census of that year but little applicable to present circumstances in those districts.
- Mortality in civil population.** In the 12 collectorates from which returns were received for the whole year, the deaths from all causes were in the ratio of 20 in a thousand of the population as given in the census of 1851. Exclusive of deaths from cholera, the ratio of mortality was 17·4, of which 0·5 in a thousand was attributed to small-pox.
- Epidemics in goals.** The condition of prisoners in gaols called for amelioration, and the occurrence of severe and fatal sickness in some of the prisons required that rules should be made for the guidance of those in charge, on occasions of the outbreak of epidemic disease. Such rules were prepared.
- Floor area for prisoners.** Standard plans for gaol buildings were issued, and the allowance of room for each prisoner was laid down. The Government of India ruled that in an associated ward, a floor superficies of 40 feet was considered by it to be enough for a prisoner.
- Mortality in gaols.** From the returns, it is found that in the permanent gaols, in an average population of 6,044, the mortality was 72·4 in a thousand; but high as this ratio is there is reason to believe that it would have been considerably higher if it had not been the practice, under certain conditions, to liberate prisoners who appeared to be dying, and to whom removal from the gaol appeared to afford the only means of prolonging life. In future returns such liberations will be distinctly enumerated. The ratio of mortality varied from 13·2 at Dharwar to 265·4 at Ahmedabad, where, besides cholera, a fatal fever was epidemic. At Hyderabad also there was excessive mortality, amounting to 256·8 per mille, and attributed mostly to diarrhoea and dysentery, fever and cholera. There were in all 10 deaths from scurvy, of which five were in the Dhoolia gaol, two at Tanna, two at Hyderabad, and one at Aden. The mortality in subsidiary gaols, gangs, and lock-ups was 51·2.
- Increase of municipal corporations.** A considerable addition was made to the number of towns that have adopted Act XXVI. of 1850, to enable them to make improvements connected with public health and convenience, and at the close of the year their number amounted to between 140 and 150.
- Municipal administration in the city of Bombay.** A new Municipal Act was obtained for the City of Bombay, and now a vigorous administration, comprising a Health Department, is doing much good.

Drainage works are begun, and increase to the water supply is contemplated ; gas is used in lighting the streets.

The death returns of 1864 have now been published ; when taken in connection with the census of that year, they show the mortality to have been 30 per mille. The deaths in 1865, as announced in the weekly Government Gazette, were in the higher ratio of 35 per mille. An adynamic fever was unusually prevalent.

Mortality in the city of Bombay.

The very great mortality that had occurred on board vessels carrying native labourers to Mauritius, led to the suspension of emigration from Bombay until investigation should be made as to the cause of the sickness. Government, on receiving a report on the subject, ordered such changes in housing the intending emigrants, and in the arrangements for their welfare on board ship, as seemed to be necessary before the suspension was removed.

Mortality in emigrant vessels.

EUROPEAN TROOPS.

At the beginning of the year the British troops amounted to 12,897. In the course of the succeeding 12 months 2,897 were received by drafts or transfers from England or the colonies. On the other hand, 1,456 returned to England on duty, and 750 left on expiry of their time of service, or obtained their discharge by purchase ; 365 were invalided, and according to the statement furnished by the Adjutant General of the Army, there were 427 deaths, 403 of them being among those called by him effectives, and 24 among the unattached. The number of deaths found in the Medical Returns, which embrace the effectives only, of the Adjutant General's Return, differs from this very considerably. There were various transfers to and from other presidencies, and 672 volunteers were left by three infantry regiments that were returning to England. The actual present strength of the army was 12,624 at the close, or 273 less than it had been at the beginning of the year. The unattached that were included in the strength amounted to 356, and the effectives to 12,268, or three and a half per cent. below the establishment. (Table I.)

Increase and decrease.

From a return dated 1st May 1865, it is found that only 7·4 per cent. of the privates of all arms were married. In the artillery there were 9·8, in the infantry 7·0, but in the cavalry the ratio was so low as 4·7 per cent. (Table II.)

Proportion of married men.

The mortality in 1865 was greater than it had been for many years. The deaths in hospital were 402, and those out of hospital 16, giving together a mortality of 35·1 per mille of strength, or considerably more than double what it had been in 1864. The deaths among invalids embarked for England are not included in the number now given, and they could not be ascertained until after the lapse of several months. It may be noticed, that while the deaths after embarkation have latterly been added, as they ought to be, to the mortality of the Indian army, the strength of the invalids up to the time when the deaths among them ceased to be noted, has not been in like manner carried to account.

Sickness and mortality.

A wide-spread and severe prevalence of cholera was the chief cause of the increased mortality, but an unusually high temperature was thought to contribute much to the severity of the sickness of the year.

Epidemic cholera.

The excess of mortality being chiefly caused by a disease that ran a rapid course, there was not a concurrent large sick list. The daily sick in hospital were but 56·4 to a thousand of strength, or less than they had been in the preceding year. The ratio of admissions in 1865 was a little greater than it had been in 1864. (Table III.)

In comparing the numbers in 1865 under the several classes of disease with those recorded in the previous year, it is found that in each class there was an increase of mortality. In zymotic disease, the ratio in 1865 was 22·7 against 6·4 of strength in 1864. In cachectic disease it was 2·6 against 1·5. In local disease the excess was not so great, the ratio being 6·6 contrasted with 6·0. In developmental disease the mortality was but small. In violent deaths the ratio in last year was 2·9 against 1·9 in 1864. (Table IV.)

The admissions for miasmatic diseases were 802 in a thousand of strength, 529.

and the deaths resulting from them were in the ratio of 21·9 or they were 624 per mille of the total deaths. For entnetic diseases the admissions were 201·8 in a thousand, or one-fifth of the whole; the deaths were two in number, or less than one in 5,000 of strength. In the other orders, the death rate was, in diseases of the digestive organs 3·0; accident or violence 2·3; diseases of the nervous system 1·4; of the respiratory 1·1; diseases of the circulating system 0·7; dietic diseases 0·6; suicide 0·4 per mille. In the remainder the ratios were still lower. (Table V.)

The European portion of the army lost 16 men in every thousand from cholera alone, the deaths from that cause being 457 per mille of all deaths. Fever caused the deaths of 3·1 in every thousand, and hepatic disease of 2·2; dysentery and diarrhoea of 2·4; and through phthisis pulmonalis the loss of life was 1·5 per mille. (Table VI.)

The cholera mortality was most severe at the stations of the Mhow Division, where 25·4 in a thousand died, or if the loss in a detachment which was marching be included, the mortality in the division was 31·3. The marching of that detachment in the middle of April was taken notice of by Government. Forty-six of the cholera deaths in the Mhow Division were in the wing of a regiment at Neemuch, and the same wing lost six men from fever, and in the great heat in May four died of sun-stroke. The mortality in this detachment amounting to 14½ per cent. of strength in a year, was the subject of a special report.

The head-quarter wing of the same regiment, which had lately arrived from England, lost 11 men in Bombay from cholera and from fever.

The Belgaum Brigade alone was exempt from loss by cholera.

Intemperance.

There were six deaths attributed to delirium tremens. A hundred and ninety-one were admitted for ebrietas, but no death is attributed to that cause in the returns. There is reason however to believe, that excessive drinking was the cause of more loss of life than is shown in the returns. One of the medical officers who reported on the sanitary condition of stations, writes of the relation that the intense heat had to *insolatio*:—"In one case only of the six treated did it (the heat) appear to be the sole cause. In all the other cases intemperance predisposed to the disease. Of six attacked, three were serjeants, who, from the steady manner in which they invariably performed their duties, were considered men of temperate and regular habits, and they will be shown as such in the temperate and intemperate return called for."

The tables of sickness and mortality at the several stations of the army are prepared from the weekly reports, and embrace the fifty-two weeks from 31st December 1864 to 29th December 1865. (Tables VII. to XVI.)

Yearly reports from stations.

In conformity with the instructions from Her Majesty's Secretary of State for India, the senior medical officers of the different stations of the army were required to furnish reports on the sanitary state of the European and native troops during the year, and of the various measures carried out, or determined on, for the improvement of their condition. A short and concise summary of the information that has been received in response to those calls, and from other sources, is now given.

POONA DIVISION.

Poona.—Owing to an additional regiment having been brought to the station, the deficiency of barrack accommodation was more felt than it would otherwise have been. Partly owing to that circumstance, and partly to the enforcement of the order giving 90 superficial feet of floor to each man in the barrack-room, many had to sleep in tents. It has been determined to erect new barracks at Kirkee for an European infantry regiment, and to give the Gorporee barracks to the general dépôt, instead of the condemned barracks it now occupies.

Temporary barracks for 564 men were sanctioned, and were begun to be erected with a view to relieve the overcrowding.

Plans and estimates for carrying out the recommendations made in the reports of 1864 on the several barracks and their subsidiary buildings, were in course of preparation at the close of the year.

New married men's quarters for the sappers and miners, and for the general dépôt were completed, excepting their out offices, and were occupied. Roof ventilators were given to the married men's quarters of the infantry regiments.

The

The ablution accommodation of the old dépôt barracks was a little improved, and an ablution room was made at the Artillery Hospital, Wanowree.

A steam mill was added to the bread and biscuit bakery. The accumulated silt of the tank near St. Mary's Church was removed.

When the wells failed in the hot season, water was brought by iron pipes from the Moota Moola river to supply the wants of the bazar population and native troops. A summary analysis of this water was made at intervals of a month, as a precautionary measure, but its quality was found not to have deteriorated at the close of the season.

A contour survey of the cantonment and its immediate neighbourhood was ordered.

The health of the station compared with that of the army generally was good. The sick in hospital were but 47·2 per mille of strength, and the deaths, exclusive of cholera, but 11·6 in a thousand; from all causes they were 18·7.

Kirkee.—Plans and estimates were being prepared, and some were already sanctioned, for carrying out the recommendations in the Inspection Report of 1864.

New family quarters were in progress. Another new barrack was occupied. Various improvements were made in the lavatories. The riding school building was converted into a gymnasium.

The deficiency of good water is always greater at Kirkee than at Poona, and the European troops had to be supplied from the Moola river. The water was in this case also analysed monthly. From March to June the organic matter in a gallon varied from 1·83 grain in the first month to 1·46 in the last, and the total solid impurities from 10·57 the maximum to 6·65 grains, which was their amount in the middle of June.

There were comparatively more admissions into hospital than in the neighbouring cantonment of Poona, and more were constantly sick; these were at the rate of 65 in a thousand. The deaths were in the proportion of only 10·6 from all causes, and were those from cholera deducted, they were only 1·8 per mille of strength.

Satura.—In order to accommodate the detachment at the increased rate of floor superficies now allowed, a temporary barrack was being built. New lavatories and bath-rooms and a plunge-bath were under construction. Quarters for 24 families were completed, and a dead-house was added to the hospital.

There was only one admission for cholera, and it did not prove fatal. The mortality from all causes was 13·6 per mille of strength, of which 4·5 resulted from fever, and the same ratio was from hepatic disease.

Sholapoor.—A separate report on this station is given in the Appendix. A field battery occupied the barracks. The overcrowding in the single men's rooms was partially relieved by some of them occupying vacant married men's quarters. The bad ventilation of these quarters was much complained of.

There were 181 admissions from a strength of 108, and there were three deaths, of which two were from fever. There was one admitted for cholera, but he recovered.

Ahmednugur.—This Sanitary Commission reported fully on this cantonment (*see Appendix*). The recommendations were being acted on. Some of them had been fully carried out, such as the abolishing of all cesspools near privies, and the using of dry earth; depositing the stable litter and refuse south of the cantonment, instead of as before at the north-west and north of the lines; enlarging the cavalry library, and ventilating the latrines. The barrack-rooms were being paved. The cleansing of the neighbouring village of Bhingar was being attended to. (*Appendix*.)

The artillery had a female hospital under construction, with its matron's quarters. The old temporary hospital was converted into dispensary, office, and store-rooms, and an hospital for native followers. The soldiers' hospital was being improved by removing the offices from its back verandah and opening windows and doorways on that side. A new latrine had been built. A block of servants' houses which interfered with ventilation had been removed.

New artillery barracks were sanctioned, also married men's quarters, and a quarter guard. The drinking water was brought by conduit from the hills

four or five miles distant; it was of good quality. Another conduit, now ruinous, was being restored to increase the supply to the European troops.

There was a severe visitation of cholera in May, and 15 died out of 39 attacked. The disease was checked when the men were moved out of the cantonment. Cholera had been present in the bazar for some time before the European troops were attacked by it. During the year the number of daily sick was 12 per mille. The deaths were in the ratio of 33·3 from all causes, or, if cholera is excluded, they were from all other causes only 7·0 of the strength.

Aseerghur.—During the cleaning of a tank, which had in part silted up and become offensive, the detachment of British troops was kept at Khandala. The medical officer in charge of the station enumerates many deficiencies in the buildings and the fortress, and recommends improvements in the ventilation of the barracks, hospital, canteen, and cook-room, improvements in the ablution rooms and their drainage, and in the guard-room and lock-up. The need for a new burial-ground had before been under consideration.

A small temporary recreation room was built, and the men had latterly a theatre; their reading-room was a barrack verandah. A fives court was being built.

Out of an average yearly strength of 122 there were three deaths, one of which was from cholera.

MHOW DIVISION.

Mhow.—The surface drainage of the station was deficient; this was in part remedied by draining the low flat ground north of the church and near the cavalry barracks in the monsoon. The complete drainage of the north-east part of the cantonment was in progress, and the drainage of the south-east part was determined on.

For the artillery, the guard-room was improved by the addition of a verandah, and the detention-room and the cells were enlarged, and all were paved; both rooms, as well as the temporary barracks and the hospital wards, got additional windows. Four blocks of quarters, each for 10 families, were in progress. Ablution rooms were being improved. The huts of the native followers were being replaced by new ones. A new hospital was to be built.

For the cavalry, the ground beside the barracks was levelled, the water-course near the riding-school was improved, and pits near the hospital were being filled up. Other pits near the stables were also to be filled. A new hospital and saddle-rooms were determined on.

For the infantry, new guard-rooms for the hospital and the fort were provided. A new hospital was nearly completed, and a new quarter-guard with cells. The barrack roofs of the cavalry and infantry were to be ceiled, and verandahs were to be given as a shelter from the heat of the sun, and the roofs were to have ventilators. Additional staircases were to be made to give readier access to the out-offices. Private bathing-rooms were to be added to the ablution rooms. Punkahs for all the barracks and hospitals were sanctioned.

The admissions into the hospitals of the station were 1879·6 per mille, and the deaths 18·1, of which 6·0 were for cholera. The fever admissions had the high ratio of 940·5, and the mortality from that disease was 2·3 of strength, and from dysentery it was the same.

Although a detachment of British troops suffered much from cholera in April, within two or three marches from Mhow, and deaths from that disease occurred among natives in the cantonment in that month, yet the European troops at the station had exemption from it until June and July.

Indore.—The ground near the barracks was not sufficiently drained. There were cess-pits that were said to be offensive. To improve the ventilation of the barrack-room, it was recommended that the closed top venetians of the doors should be made to open. The improvement of the cook-room ventilation was ordered. There was no dead-house to the hospital.

In the detachment, with its average strength of 113, the number daily sick was only 3·2. There was one death during the year. The solitary case of cholera that was admitted recovered.

Neemuch.—

Neemuch.—The sanitary condition of this station has recently been noticed in a special report on the severe sickness in a wing of Her Majesty's 45th Regiment. The infantry barracks which it occupied were constructed at the time of the mutiny for temporary occupation, and, it is said, with a view to leave the best site free for the permanent buildings, they were placed on the leeward slope of a ridge. Much labour had been expended in trenching and draining the low-lying black soil at the bottom of the hollow, but, it is said, without much benefit. There was difference of opinion as to the permanent occupation of the station with European troops, and during the several years of uncertainty much sickness was endured by the infantry corps. During last year it was decided that Neemuch should continue to be garrisoned by a battery of artillery and a wing of European infantry, and it was determined to build new barracks on a better site.

There was but little done for the improvement of either the artillery or infantry lines during the year. For the artillery, the staff serjeants' quarters were improved, and a privy with a covered passage was constructed for the hospital.

There was some alteration made in the drainage of the infantry family quarters.

The wing of infantry suffered most in the great sickness at this station. The European troops had a mean strength of 465. The admissions were in the ratio of 2,355 per mille, but the daily sick were not in greater ratio than 69. The mortality from all causes was 159·1, of which 105·3 per mille was from cholera, 15·0 from fever, and 6·5 from hepatic disease. Sun-stroke during the unusually great heat of the weather added largely to the mortality. The infantry moved into tents twice to escape from the epidemic, but without immediate benefit. The second occasion of their doing so was at the close of the rains, when febrific miasm was most powerful, and it is probable that the fever from which the men suffered was aggravated in severity by their sleeping in tents, although all had cots.

Nuserabad.—The supply of good water was scanty, and was brought from a well a mile and a half or two miles distant from the barracks. The artillery lines were deficient in properly built canteen and serjeants' mess. The school-room, library, and also the staff serjeants' and married men's quarters were bad and very hot. There was no isolation ward nor a female ward to the hospital; its dispensary was enlarged and a guard-house was built.

For the infantry, 16 of the proposed quarter company ground-floor barracks, for nine companies, were completed. The continuous raised roof ventilator had not sufficient overlap to keep out rain; this was being remedied. The future barracks will be with upper floors. The cookhouse was smoky; it was attempted to remedy this. The married men's quarters were low roofed and very hot; they were deficient in privy accommodation. The guard house was too small and dark, and was insufficiently ventilated. The cells were being enlarged and ventilated.

The hospital was said to be over-ventilated with square openings in the walls near the floor, and to be too dark.

Punkahs for all barracks, hospitals, and family quarters were sanctioned.

The average strength was 693, and the number constantly in hospital was in the millesimal ratio of 42. The mortality from all causes was 30·3, and if the 13 deaths from cholera were omitted, the mortality would be only 11·5, of which 4·3 were owing to fever. Cholera appeared twice at the station—first in June, and afterwards in October, and it affected chiefly the European troops. They were moved into tents to escape from the disease, and with success.

NORTHERN DIVISION.

Baroda.—The cantonment is in a level, highly cultivated district, and on ground which is only partly above the flood of the river that flows between it and the neighbouring populous, unclean town. Some of the barracks have high plinths, but none have upper floors, and all are placed with their end to the wind. After the severe visitation of sickness in the hot season, it was determined that instead of a whole field battery, only a division should in future be kept at Baroda, and that it should be frequently relieved from the head quarters

at Ahmedabad. It was determined that a new upper floor barrack should be built.

Improvements were made in the ventilation of the quarter guard, a verandah was added to it, and the detention room was enlarged. A new latrine was built. The removal of the huts of native followers near the hospital was contemplated.

In June the battery was attacked with cholera, which had for some time before been prevalent in the town of Baroda. In about five days there were 30 cases, of which 14 proved fatal. The men were at last moved into tents, and although the camp was at a distance of not more than a mile and a half from the barracks, the spreading of the disease among them immediately ceased. The mortality from all causes was 20 in a strength that for the year had an average of only 95.

Ahmedabad.—The increased floor superficies allowed to each man, and the removal hither of two divisions of the Baroda battery rendered it necessary to arrange for temporary shelter for part of the troops.

The existing barracks were of temporary construction, on low plinths and with only a ground floor. The family quarters were insufficiently ventilated. The staff serjeants occupied temporary thatched huts. The guard room was too small and was unventilated. The cells were too small, and they were crowded together. The hospital was a ground floor building of too limited dimensions, and with imperfect subsidiary accommodation.

The barrack temporary ablution room had four bath rooms added to it.

A verandah was added to the quarter guard, and the ventilation of the cells was improved. A rear verandah was being constructed for the family quarters.

The single men's barracks were being paved. Temporary stabling was in progress of construction.

The mean strength of the troops was 143. The ratio of daily sick was 79 in a thousand. The total deaths were five, of which three were from cholera. There had been much cholera in the neighbouring city, first in February, then in May, and also among the natives in the cantonment. The European soldiery had exemption from it until the day after the arrival from Bulsar of a party of invalids who had unfortunately halted some hours at Baroda, where the epidemic was severe. Three men died.

Deesa.—To reduce the excess of men in the barracks, tents were made use of by some as dormitories. Temporary barracks were ordered to be constructed, and also quarters for officers. During the year the ventilation of the infantry barracks was increased by openings near the floor, in the walls and doors. The ablution accommodation was enlarged. The ventilation of the hospital, guard room, and of the canteen was improved. Quarters for 20 families were in progress. Punkahs were given for all married men's quarters. A gymnasium was completed.

For the artillery, harness rooms, and workshops were in progress. The barrack floors were being paved. New latrines and urinaries were built. The ventilation of the guard room was improved. The schoolroom was enlarged. It was proposed to heighen the walls of the hospital; its windows were to be converted into doors.

The average strength at the station was 837, and the proportion in hospital was but 45 to a thousand. Two men died of cholera. Exclusive of these, the mortality was 16·9 to a thousand, and 6·0 of it was from fever, and 2·2 from hepatic disease.

SIND DIVISION.

Kurachee.—The sanitary condition of the station was bad. In the neighbourhood of the artillery lines there were hollows and watercourses that were made the receptacles of ordure; and the lines of the workmen of the arsenal had become crowded with strangers, and huts had been built beyond the original limits, so as to encroach on the small space that there was between those lines and the barracks. Government, considering the proximity of such a population to be dangerous to the European troops, sanctioned the removal of the workmen to a more distant spot, and the clearing of the ground of their former lines and of all huts. This was effected only at a considerable outlay in compensation to those who had been so wrongly permitted to hold property there. In the Napier lines of the infantry, cesspits had been allowed to exist beside the latrines for liquid

liquid excreta, and at the cook houses for fluid refuse, and also besides the lavatories, altogether in number greater than the regulated establishment could empty regularly. For present exigency an increase of establishment was thought to be necessary, but a more wholesome and economical arrangement for the disposal of waste water and refuse was recommended. The condition of the officers' premises was the subject of complaint and of further inquiry, which led to strict orders for the maintenance of cleanliness being issued from army head quarters.

The water supply was bad; brackish bathing water was obtained from wells near at hand, but water for drinking was conveyed by pipes from wells at a distance, and it was largely impregnated with saline matter, chiefly chloride of sodium, although it had not more organic matter than two-thirds of a grain in a gallon.

New staff serjeants' quarters and quarters for first class hospital establishment were provided. The ground-floor of one of the artillery barracks was converted into a serjeants' messroom and a schoolroom for adults. The children's schoolroom was improved, and a covered bowling alley was being constructed.

In the Napier lines a reading room was being built.

The improvement of all the ablution rooms was ordered.

The average strength was 1,022; the number of daily sick in hospital was 44 per mille. The total mortality was in the ratio of 25·4, or, deducting cholera, it was 15·6. From fever 2·0 died, and the same proportion from diarrhoea and from dysentery.

Hyderabad.—There was no overcrowding in the barracks, but the accommodation in the guard-room at the garrison prison was deficient. The disused horse lines were offensive, but they were cleaned. The barrack urinaries were offensive, and were too near the men's rooms; they were beside the lavatory, and were most objectionably flushed into cesspools with the waste water.

Punkahs and watered tuttees were used in the hot months in barracks, family quarters, and prison cells.

Notwithstanding the proximity of the barracks to the Indus river, water is carried in carts, and the troops are on a small allowance. The baths are unused for want of water.

A new guard-room was being built in the fort.

The mean strength of the European force was 376, the admissions into hospital were 344, or 914·9 to a thousand; the daily sick was in the ratio of only 34 to a thousand, and the mortality but 8·0 from all causes, or, deducting 2·7 for cholera, it was only 5·3 per mille.

BOMBAY BRIGADE.

Colaba.—The condition of the habitations of the native civil population in the neighbourhood of the barracks was greatly improved after the new Municipal Act came into operation. The overcrowding in barracks was relieved in the dry season by using tents as dormitories. It was determined to erect temporary additional barracks. Vehar water was being laid on by pipes to the barracks. The hospital latrine was reconstructed.

New permanent barracks were to be constructed.

The average strength of the wing of the regiment which formed the European part of the garrison was 467, of which 36·5 were constantly in hospital, the ratio being 78 per mille. The ratio of mortality was 42·8 from all causes, or exclusive of cholera, it was 19·2, of which the fever mortality was 10·7, and that from hepatic disease 4·3. Cholera, which had been more severe than usual in Bombay, attacked the corps in March, and between that time and July caused 11 deaths. On the first appearance of the disease the men were moved into tents, but cases continued to occur. The sickness from enthetic disease was comparatively little, the admissions from it being 83·5 per mille.

BELGAUM BRIGADE.

Belgaum.—The artillery horse lines were objectionably placed to the windward of the men's lines, and they were complained of as being offensive and unwholesome. Two quarters from staff serjeants, a staff serjeants' mess-room,

an orderly-room, and a schoolroom, also a canteen and coffee-room, were built. A workshop is under construction. Two bath-rooms were added to the hospital of the infantry.

Temporary barracks, to meet the present increased demand for room, were ordered to be constructed.

The force consisted of a regiment of infantry and a field and a garrison battery of artillery, amounting to 932 men. The ratio of daily sick was 58, the deaths from all causes 12·9. There were two admissions for cholera, but no deaths. The admissions for enthetic disease were in the proportion to strength of 289·7, and there was one death from it. Yet there is a lock hospital.

ADEN BRIGADE.

Aden.—The rule that every man should have 90 feet of floor superficies, and that verandahs should not be occupied with cots, rendered it necessary to use tents as dormitories. Water was scarce, and the supply was in part obtained by distillation. Vegetables were scarce, and in consequence many men suffered in health. Arrangements were made to obtain potatoes from Egypt during the next south-west monsoon, when it would be difficult to get them from Bombay.

There was much building. Four upper-storied barracks at Front Bay were in progress. Two blocks of quarters for 26 families at the Isthmus were in progress. The barrack floors were paved, and subsidiary buildings were erected. Two upper-storied barracks at Steamer Point were in progress.

The family quarters of the European infantry were ventilated.

The average strength during the year was 712, and the daily sick 34·1, or in the proportion of 47·8 to a thousand. The ratio of deaths to strength from all causes was 59·0, of which 15·4 were from cholera. Hepatic disease caused 7 per mille of deaths. There were 14 men admitted for scurvy, and one died.

SANITARIA.

Poorundah.—At the beginning of the year the barrack-rooms were over-crowded, and the verandahs also were occupied. One of the barracks was burnt. Tents were pitched to relieve the over-crowding. During the year two additional barracks were completed, and the restoration of the one burnt down was in progress. Several out-offices for the barracks were built, and quarters for the hospital subordinate establishment were in progress.

The bazar, which had been allowed to encroach on the barrack precincts, was ordered to be removed to a spot chosen for it at a distance. A Moosulman burial-ground was closed, and another was given beyond the cantonment limits. A site for a slaughter-house was chosen down the hill. A tank was fenced for safety, and the drains of the cantonment were improved.

The annual mean strength was 67; the deaths were six, of which three were from cholera. The recent frequent occurrence of this disease appeared to be attributable to the close proximity of the habitations of native followers and settlers, who were in communication with places in the neighbouring valleys where cholera was epidemic. This probable occasion of infection was being removed.

Abou.—The condition of this station was not satisfactory. The hollows between the undulations of the surface formed shallow, uncultivated, undrained basins, bearing sedges, and were considered the source of malaria. There was much uncleanness of the ground, owing to there being at first no provision for the necessities of the numerous workmen employed in building. To remedy this latter evil, six latrines were erected for the followers. Eleven additional barracks were completed. An upper-floored hospital, two blocks of quarters, each for 12 families, four quarters for staff serjeants, and a library and reading room were in progress. A female hospital, workshop, gymnasium, and a skittle alley were determined on.

This sanitarium is resorted to by invalids from Goozerat and Rajpootana.

Bulsar.—This has hitherto been merely a fair-weather camp for invalids.

It was injudiciously placed close to the railway station, a locality deficient in sanitary police, and so far from the sea shore, that the fatigue of going to the sea interfered with the benefit that was expected from sea bathing. The expediency of erecting permanent buildings there for the accommodation of a large body of invalids throughout the year had been questioned, and a special report on the subject was rendered to Government.

The strength of the detachment which was encamped at Bulsar from 1st January to 13th June was 36; the average sick in hospital during the same period was 4·5.

Ghizree.—The buildings of this sanitarium are of temporary construction. Better buildings were intended to be built, but the question again arose as to the comparative advantages of this situation and Munora Point, and caused delay. There was little alteration or addition made during the year.

The average strength during the year was 51, and the mean daily sick in hospital 5·2.

NATIVE TROOPS.

From a statement furnished from the office of the Adjutant General of the Army, the strength of the native army on 1st January 1865 was 26,102, and during the year 1,696 recruits joined it, while 493 deaths were reported. 1,015 were invalided, and 758 left through reduction of establishment, summary dismissal, and desertion. On the 1st January 1866 the strength was 25,532. The mean of the numbers borne on the rolls at the beginning and the end of the year was 25,817.

Increase and decrease.

The average strength taken from the monthly returns of hospitals was 24,737. This represents the number of those present with their corps, and the difference between this average and that founded on the Adjutant General's statement, and amounting to 1,080, is probably the number absent on leave; it is 4 per cent. of the entire army.

The deaths recorded in the military returns far exceed in number those in the medical returns, and even calculating them on the entire mean strength, they are in ratio much greater than the deaths in hospital calculated on the actually present strength. The former are 18·1 per mille, the latter only 14·8.

It is likely that among those who obtained leave of absence there were many invalids, and that the mortality among them was great. The 128 deaths that are in excess of those that took place in hospital are 11·8 per cent. of the 1,080, by which the entire strength of the army exceeded the present strength shown in the hospital returns.

The mortality in hospital from 1st January to 31st December in 1865, does not differ much from 14·3, which it was in 1864. The mortality in the native army is less than it would be were there the same impediments to the speedy discharge of the sickly that there is among the British troops serving in India. Exclusive of cholera, the mortality in hospital during 1865 was 9·6 per mille.

Sickness and mortality.

The proportion of hospital admissions to strength was 1068·7 per mille, which was greater than in the preceding year. The number daily sick was 40·5 in a thousand. (Table XVII.)

The deaths from zymotic diseases were 10·9 of the strength, and 73·9 per cent. of all deaths. From local diseases 2·5 in a thousand died. (Table XVIII.)

Miasmatic diseases caused 695·8 admissions in a thousand of strength, or 65·0 per cent. of all admissions, and 61·9 of all deaths. Dietic diseases caused 9 per cent. of the deaths. In decreasing order, the mortality was from diseases of the respiratory system 7·4, of the digestive system 4·1, of the nervous system 3·3 per cent., and from atrophic disease also it was 3·3 of the total mortality. From each of the orders phthisic, enthetic, and accident or violence, it was 1·9 per cent. (Table XIX.)

The deaths from cholera were 5·2 per mille of strength, and were 35·1 of all deaths. In every thousand men 2·3 died of fever, 1·3 of scurvy, and one of dysentery and diarrhoea. The deaths from these diseases were in the ratio to all deaths of 15·6 per cent. from fever, 9·1 per cent. from scurvy, and 7·4 from dysentery and diarrhoea. Deaths from hepatic disease and icterus together amounted to 1·2, and from phthisis pulmonalis to 1·6 per cent. of the entire mortality.

The exemption of native troops from deaths from the small-pox is worthy of notice. It may be attributed to the attention that is given to vaccination

throughout the native army. Not only is it the care of the medical officer that the men themselves are protected from the disease, but vaccination is assiduously practised among the families, and the monthly returns seldom have to show any unprotected, except very recently born children. (Table XX.)

POONA DIVISION.

Poona.—A third native infantry regiment arrived during the year, and was lodged partly in thatched huts hastily erected, and partly in the Native Sappers old lines. The Sappers went into tents. There were many admissions for guinea-worm in the other two regiments; and the use of a well, which was suspected of being the source of the evil, was prohibited. The cavalry lines are on a patch of gravelly ground, in the middle of black soil. They were placed near the river with a view to convenience in watering the horses, but as the river ceased to flow during several months, the expectation was disappointed. There was inconvenience and hardship from want of water. The want of latrines was complained of. A permanent hospital was sanctioned to replace the present temporary building.

The native portion of the force consisted of three regiments of infantry and a regiment of cavalry. The average strength at the station was 2,273, and the sick in hospital were 61·5 in a thousand. Cholera caused 3·1 deaths per mille, and fever 0·9, which was a low ratio, when the admissions for it were 601·8. One of the regiments had a wing stationed at Tana, where the duty was said to be severe. There were cases of scurvy both in the cavalry and the infantry; the medical officer of the former corps mentions the inconvenient distance of the men from a bazar where they could obtain vegetables and meat. One regiment lost two men from dracunculus, the ankle joint being affected.

Kirkee.—Sappers and Miners, of strength 160, were the only native troops stationed there. They lost four of their number by cholera, and one by dysentery. New lines are being built.

Ahmednugur.—The condition of the lines and of the regimental bazar, and the progressive filling up by it of the small interval between the town and the lines were mentioned in the Inspection Report, which is in the Appendix. The hospital was deficient in ventilation.

The mean strength of the regiment was 662, and the average number in hospital was but 33 per mille. Cholera caused seven deaths. The regiment moved into tents, and although there was heavy rain, the progress of the disease was at once arrested. The only other death was from fever.

Sholapoor.—In the report of the inspection, which is in the Appendix, the objectionable circumstance was mentioned of the regimental bazar filling up the interval that should have been left between the lines and the Sudur Bazar. An estimate of the cost of removing the regimental bazar was ordered.

The infantry and the squadron of cavalry together had an average strength of 693, and only 187 per mille constantly in hospital. There was no cholera, and no death from fever, and comparatively few admissions for that disease.

Seroor.—Occupied by the Poona Irregular Horse. The lines are near a small river. Almost every hut has a small court enclosed with a mud wall about six feet high, in which are the cooking place, bathing place, and privy.

The average strength of the corps at head quarters was 252, and 27 per mille were daily in hospital. Cholera appeared, but was not fatal. There were in all three deaths; they were from fever, dysentery, and diarrhoea.

Maligaum.—The native infantry regiment built for itself new lines.

The strength was 630; the daily sick 21 per mille. Eight died of cholera and two of fever.

Aseerghur.—A tank close to the native infantry lines had become offensive, and was being cleaned out. The latrines were to windward of the European barracks, and occasionally offensive. An old building, the Kiladar's house, obstructed the breeze. The Sudur Bazar at the foot of the hill was unhealthy; the inhabitants were anæmic.

The strength of the detachment was 178, the number in hospital daily was four.

four. The only two deaths were from cholera. The admissions for fever were in the ratio of 505 per mille.

Dhoolia.—The average strength of the troops was 616. Thirty-one per mille were daily in hospital. There were 10 deaths, of which three were from cholera, one from fever, one from dysentery, and four from scurvy. This last disease is said to have begun to be prevalent in June, and to have continued so until the end of the year, when it appeared to be declining; 38 men were admitted for it.

MHOW DIVISION.

Mhow.—The men of the Native Infantry were building new lines, and had completed those of one regiment, the sites being on black soil, near the base of the low ridge on which the cavalry barracks were built. There was much to be done in draining the ground. The only latrines at present are trenches in the ground. The strength was 1,141, and the daily sick were about 59 per mille. The deaths were 14, or at the rate of 12·3 per mille; two were from cholera, and seven from fever, and there was only one death out of 11 admissions for scurvy.

Indore.—A wing of Native Infantry was stationed there, and was relieved from Mhow every six months. The lines are about two miles south-west from the city, on elevated ground, surrounded with black soil. They face the civil lines on the south. The rooms are small and unventilated. New huts were recommended to be built. The remains of former lines had not been removed. There were no latrines. The sick were treated in Holkar's General Hospital, which was unsatisfactory.

The detachment had a mean strength of 206, of which four were daily sick. The only death was caused by cholera.

Augur.—The wing of a Native Regiment stationed there, with a regiment of Central India Horse, occupied the former lines of the Gwalior Contingent Infantry. They were of sun-dried brick and were tiled. They had been spoilt by the verandahs being built up so as to obstruct ventilation.

The detachment had a mean strength of 291, and had 3·4 per mille always in hospital. The only three deaths were caused by cholera.

Mehidpoor.—The wing of a Native Infantry Regiment was stationed there. The cantonment is in a depression close to the Sipra river, which is nearly stagnant from being dammed some miles below. The ground is difficult to drain and is liable to inundations. The removal of the cantonment to higher ground was contemplated.

The average strength was 334, of which five were constantly in hospital, or about 15 per mille. The only death that occurred was from cholera.

Neemuch.—The strength of the troops was 897, and 2·9 per mille were always sick. The death from all causes were four, or at the rate of 4·5 per mille. One death was from cholera and one was from fever. The fever admissions were 620 per mille. Cholera was much more severe among the European than the Native troops at this station.

Nuserabad.—The ventilation of the hospital of the Native Infantry was improved.

The strength of infantry and cavalry was 864, and 8·4 per mille were daily sick. Although cholera twice attacked the European troops the Native troops had entire exemption from it. There was no fatal case of fever, and the admissions for that disease were but 367 per mille of strength. There were, however, eight deaths in the year, three of which were from scurvy out of six admissions.

NORTHERN DIVISION.

Surat.—The surface drains for monsoon waters were not sufficient. The ground between the lines and the hospital was uneven. The lines were bad. The building of new lines was said to be intended. Water for drinking had to be brought from a distance.

The strength of the infantry regiment forming the garrison was 607. The proportion in hospital was 26 per mille.

The admissions exceeded the strength in number, being 1067·5 per mille. There were 11 deaths at the station, and nine of them were from cholera.

Broach.—The lines of the small detachment were said to be high and airy, and the men to have ample accommodation in the pendal, the space for each being double what it had been.

The detachment had a mean strength of 63. The admissions were very numerous, being 91 in the year. Fever was prevalent, but there were no deaths from any cause.

Baroda.—The average strength of the infantry forming the native part of the force was 654, of whom 20 were daily in hospital. The admissions into hospital were 656, and there were in all 12 deaths. Cholera began early in June, having been introduced by two men who had, contrary to orders, visited the city where it was prevalent; five men died of the disease, and also some women and children in the regiment. In the Sudur Bazar it was less severe than in the preceding year. Two died of fever and one of diarrhœa. There were two deaths from scurvy, which had been contracted by the sufferers when on furlough.

Ahmedabad.—The means for maintaining cleanliness in the regimental lines, bazars, and hospitals were sufficient, but in other parts of the cantonment, which is extensive, sweepings were frequently allowed to accumulate for some days. When collected they were deposited in a pit on the bank of the river, objectionably near to the Sudur Bazar. The want of latrines for the regiments and bazar inhabitants was much felt. The lines of one of the regiments were lately rebuilt.

There were two infantry regiments with average strength of 1,223. The ratio of daily sick was 18·7 to a thousand. The ratio of deaths from all causes 36·8, or exclusive of cholera only 8·2. The admissions for fever were comparatively few, and there were no deaths from that cause. Two died from dysentery and one from diarrhœa. There were three admissions and two deaths from scurvy.

Deesa.—In the Native Infantry Hospital the ventilation was improved.

The average strength of infantry and cavalry was 868; the ratio of daily sick per mille 27, and of deaths in the year 4·6. One of the four deaths was from fever, and one was from phthisis pulmonalis. There were no cases of cholera. Five were admitted for scurvy, but there were no deaths from it.

Rajkote.—A gutter was cut in the rear of each line of huts, and it kept the men's habitations drier than they had been before. There was want of proper drainage for waste ablution water.

The daily sick were in the ratio of 36 in a thousand; the average strength was 728; it was composed of infantry, cavalry, and artillery. There were eight deaths, of which one was from fever, one from dysentery, and one from diarrhœa. There were 31 admissions for scurvy, and one death from it. The prevalence of the disease was attributed to scarcity of fresh vegetables and bad quality of the grain at Dwarka, where a large detachment was furnished from Rajkote.

Bhoj.—The average strength present at the station was 396; the mean daily sick 18, or in the proportion of 45 in a thousand. The admissions were numerous, and 317, or more than half, were for fever, but there was no death from that disease. Of 12 admitted for scurvy, two died. The entire deaths from all causes were six.

SIND DIVISION.

Kurachee.—The condition of the lines of the Belooch Regiment was bad, there being a cess-pit in connection with every married man's hut. The bathing water flowed from the hut to an excavation outside, where it formed an offensive pool. This evil was in some measure checked. The married men's huts afforded to each person—man, woman, or child—40 feet floor superficies, and 360½ feet of space. Each single man had a superficies of 70 feet, and space of 670 feet. The latrines were foul and without soil-vessels. The neighbourhood of the hospital was unclean.

The average strength of Native troops was 462, of which 10 were in hospital.

hospital. The deaths during the year were 16, of which 13 were from cholera, and one from fever. The first case of cholera in the province was in a person recently arrived from Bombay, and residing in the Native Infantry lines. The disease spread with rapidity. The regiment was removed from the cantonment to tents.

Hydrabad.—The Sudur Bazar was several times complained of as filthy. The regimental latrines were improved. An old bazar, which was before the hospital, was removed.

The average strength was 743, and 2·3 per mille were sick in hospital daily. Three died, which was at the rate of 4 per mille, and one of those deaths was from cholera.

Jacobabad.—When the station was first formed, water was scanty and bad, and was found only at a great depth. Now water flows from the the Indus by canals during the inundation, and the whole cantonment is intersected with water-courses. The ground is becoming more fully charged with moisture, and at a spot where formerly water was not found at a depth of 35 feet, it was found last year at 20 feet from the surface. The cantonment is thickly wooded with large trees.

The old outposts having become untenable during the inundation, new posts were occupied, and at first the men had great exposure to vicissitudes of climate, and had water of bad quality until proper wells were made.

In the hospital of the Sind Horse there was ample accommodation under the system followed of treating all, except serious cases, as out-patients. For the Rifle Regiment, its hospital was insufficient during the sickly season.

The force during the year was 2,237 strong; the sick in hospital 89, or 39 per mille. There were 643 in a thousand admitted for fever, and four men died of it, or in the ratio of 1·8 of strength. One died of hepatic disease, and one of scurvy.

BELGAUM BRIGADE.

Kolhapoor.—The supply of water was scanty in the hot season.

The strength of the troops was 605, and the daily sick were in the proportion of 38 in a thousand. The admissions were 461·2 to strength, and the deaths 21·5. One death was from cholera, one from fever, four from dysentery and diarrhoea. One man, out of two admitted, died of scurvy.

Kuludghee.—The mean strength present was 370; the ratio of daily sick 48 per mille. Two men died, one of them from cholera.

Belgaum.—The surface drains were deepened with advantage. One of the regiments completed new lines for one of its wings; the plinths are a foot and a-half high; each private has a floor superficies of ten feet by nine.

Latrines for one of the regiments were still wanting.

The average strength was 1,275, of which 36 per mille were in hospital. There were 10 deaths, three of them from fever, and three from hepatic disease. There was no admission for cholera.

Dharwar.—There were 21 always in hospital, out of a mean strength of 706, or at the rate of 29 in a thousand. There were eight deaths, of which one was caused by cholera and one by dysentery. There were no deaths from fever. Two died from enthetic disease.

BOMBAY BRIGADE.

Bombay.—The old Marine Battalion lines and the Boree Bunder lines are both in unhealthy neighbourhoods. The cost of maintaining their families, owing to the high prices in Bombay, is thought to be the occasion of the prevalence of scurvy. The strength of the two regiments was 1,690; the daily sick amounted to 90, or 53 per mille. The deaths were 66, or 39 per mille of strength. Of these, 14 men died of cholera, 23 of fever, four of dysentery and diarrhoea, and nine of scurvy; there were 97 admissions for this disease.

Tuna.—The lines are old, confined, and badly situated, on low ground, having a gentle slope towards a tidal creek which is only a few yards from the lines,

and presents a large surface of mud at low tide. The drains are open and fall into the creek, and its margin is the common resort of the men and their families, there being no privies.

The detachment was furnished by one of the Poona regiments; it had an average strength of 327, and had eight daily sick. Its duties were said to be severe. There were two deaths, of which one was from cholera. The fever admissions were 468 per mille; for dysentery and diarrhœa together they were about 150.

ADEN BRIGADE.

Aden.—New lines for the regiment of Native Infantry were completed. The site at the Isthmus, where the Native Artillery were located, was only 18 inches above high water, and was damp. The Sappers and Miners were mostly encamped where their services were required.

The average strength during the year was 962, of which 66 per mille were in hospital. The ratio of admissions to strength was 1140·3, of deaths it was 20·8. Five died of cholera, one of fever, two of diarrhœa, two of enthetic disease. There were 119 admissions and five deaths from scurvy. Scurvy has been the cause of great sickness since the station was first occupied, and many labourers on the public works have lost their lives by it. It has already been mentioned that an addition has been made to the articles composing the rations issued by the Commissariat. The severest cases of scurvy are said to be among the men returned from detachment at Perim.

The Perim detachment consisted of 75 men, and it was relieved every two months. The deaths on the island were four; the admissions for scurvy were 34, and one of them ended fatally. The medical officer who furnished the report for last year writes:—"The men proposed to be sent (to Perim) are previously individually inspected by the medical officer, and not a tainted man allowed to go, yet the detachment which returned early this month had two fatal cases from scurvy, and the majority had either to be admitted into hospital as confirmed cases, or to receive limejuice out of hospital, as tainted." The diet is thought to be faulty, and the medical officer was taking measures to have it improved.

TABLE I.—INCREASE and DECREASE among the BRITISH TROOPS serving in the BOMBA PRESIDENCY during the Year 1865.

(From the Office of the Adjutant General of the Army.)

						Effectives.	Unattached List.	TOTAL.
Strength on 1st January 1865 - - - - -						12,529	368	12,897
INCREASE.								
						Effective.	Unattached List.	TOTAL.
Recruited in India - - - - -						15	-	15
Drafted or transferred from England or Colonies - - - - -						2,897	-	2,897
Transfers received - - - - -						1,029	-	*1,029
Joined from desertion - - - - -						6	-	6
TOTAL Increase - - -						3,947	-	3,947
* Exclusive of 27 men remanded from Unattached List.						16,476	368	16,844
DECREASE.								
Time-expired - - - - -						688	2	690
Discharged by invaliding - - - - -						362	3	365
Ditto by purchase - - - - -						24	6	30
Ditto by court martial - - - - -						14	-	14
Ditto otherwise - - - - -						-	9	9
Deserted - - - - -						19	2	21
Transfers given - - - - -						1,205	1	†1,206
Transferred on duty to England or Colonies -						1,456	-	1,456
Ditto by invaliding to England or Colonies -						-	-	-
Died - - - - -						403	24	427
Promoted to honorary commissions - - -						-	2	2
TOTAL Decrease - - -						4,171	49	4,220
† Exclusive of 64 men transferred to Unattached List.						12,305	319	12,624
REVERSIONS.								
Remanded from Unattached List to Effectives - - - - -						-	-	27
Transferred from Effectives to Unattached List - - - - -						-	-	64
Difference to be deducted from Effectives and added to Unattached List - - -						37	37	-
Strength on 1st January 1866 - - - - -						12,268	356	12,624

N.B.—The following information respecting Transfers is explanatory of the items under that head:—

RECEIVED.			
Transfers received from other Presidencies and from St. Helena Regiment		45	}
Ditto Locals volunteering for general service - - - - -		312	
Ditto between corps serving in the Presidency of Bombay - - - - -		672	
Received from 44th, 56th, and 72nd Regiments previous to embarkation of these corps for England - - - - -			1,029
GIVEN.			
Transfers to other Presidencies - - - - -		20	}
Ditto between corps in the Presidency - - - - -		311	
Ditto given by 44th, 56th, and 72nd Regiments to corps serving in this Presidency - - - - -		672	
Ditto - - ditto - - ditto in other Presidencies - - - - -		202	
Ditto granted commissions from the ranks - - - - -		1	
			1,206
DECREASE during the Year (Transfers) - - -			177

TABLE II.—NUMBER OF MARRIED and UNMARRIED EUROPEAN NON-COMMISSIONED OFFICERS and SOLDIERS Serving in the BOMBAY PRESIDENCY on the 1st day of May 1865.

(From a Return given by the Adjutant General of the Army.)

				Staff Serjeants.			Serjeants.			Rank and File.		
				Establishment in India.	Actual Strength.		Establishment in India.	Actual Strength.		Establishment in India.	Actual Strength.	
					Married.	Unmarried.		Married.	Unmarried.		Married.	Unmarried.
<i>Artillery.</i>												
Royal Horse Artillery, E Brigade.	Head Quarters	-	-	5	4	1	-	-	-	-	-	-
	A Battery	-	-	2	1	1	6	3	3	137	9	115
	B Ditto	-	-	2	2	-	6	2	4	137	7	125
	C Ditto	-	-	2	2	-	6	4	2	137	13	112
	D Ditto	-	-	2	-	2	6	3	3	137	12	117
Royal Artillery, 14th Brigade.	Head Quarters	-	-	5	2	3	-	-	-	-	-	-
	D Battery	-	-	2	1	1	6	2	4	137	8	149
	E Ditto	-	-	2	1	1	6	2	4	137	12	114
	F Ditto	-	-	2	2	-	6	1	5	137	8	146
18th Brigade	Head Quarters	-	-	5	3	3	-	-	-	-	-	-
	A Battery	-	-	2	-	2	6	2	4	137	17	119
	B Ditto	-	-	2	2	-	6	4	2	137	15	126
	C Ditto	-	-	2	1	1	6	4	2	137	17	120
	D Ditto	-	-	2	2	-	6	3	3	137	13	123
	E Ditto	-	-	2	2	-	6	4	2	137	13	125
	F Ditto	-	-	2	2	-	6	2	4	137	14	122
	G Ditto	-	-	2	2	-	6	2	4	137	18	128
21st Brigade	Head Quarters	-	-	4	5	-	-	-	-	70	-	-
	No. 1 Battery	-	-	1	1	2	4	2	5	70	13	71
	" 3 Ditto	-	-	1	1	-	4	2	2	70	7	59
	" 4 Ditto	-	-	1	1	-	4	4	-	70	12	55
	" 5 Ditto	-	-	1	1	-	4	-	4	70	4	62
	" 6 Ditto	-	-	1	1	-	4	2	2	70	12	58
	" 7 Ditto	-	-	1	1	-	4	2	2	70	6	64
TOTAL - - -				53	40	17	108	50	61	2,338	280	2,115
<i>Cavalry.</i>												
Her Majesty's 3rd Dragoon Guards - - -				10	(^a) 5	6	28	7	21	477	23	401
Ditto - - 6th Inniskilling Dragoons - - -				10	(^b) 4	5	28	7	21	477	19	446
				20	9	11	56	14	42	954	42	847
<i>Infantry.</i>												
Her Majesty's 4th Regt. of Foot, 1st Battalion				8	(^c) 4	2	40	17	16	871	38	692
Ditto - - 33rd " - ditto - - -				8	(^d) 8	1	40	18	18	871	45	752
Ditto - - 44th " - ditto - - -				8	(^e) 7	2	40	17	18	871	66	664
Ditto - - 45th " - ditto - - -				8	4	(^f) 5	40	21	19	871	82	765
Ditto - - 56th " - ditto - - -				8	(^g) 6	(^g) 2	40	11	26	871	29	758
Ditto - - 72nd " - Highlanders				8	(^h) 4	2	40	6	27	877	38	697
Ditto - - 95th " - Ditto - - -				8	(ⁱ) 6	3	40	9	27	(^h) 871	55	760
Ditto - - 103rd " - Ditto - - -				8	4	(^j) 3	40	21	8	871	84	819
Ditto - - 106th " - Light Infantry				8	(^k) 4	5	40	10	21	871	60	577
Ditto - - 109th " - Ditto - - -				8	(^l) 4	4	40	13	26	871	48	761
				80	51	29	400	143	206	8,716	545	7,245
Her Majesty's Bombay Sappers and Miners -				2	1	1	4	8	6	8	5	7
TOTAL - - -				155	101	58	568	215	315	12,016	822	10,214

(^a) Includes schoolmaster.(^b) Includes schoolmaster.(^c) Includes schoolmaster and armourer.(^d) Includes schoolmaster.(^e) Includes schoolmaster and armourer.(^f) Includes schoolmaster.(^g) Includes schoolmaster and armourer.(^h) Includes schoolmaster and six pipers.(ⁱ) Includes schoolmaster.(^j) Includes schoolmaster.(^k) Includes schoolmaster.(^l) Includes schoolmaster.

III.—SICKNESS and MORTALITY among EUROPEAN TROOPS.

YEARS.	Mean Strength from Weekly Returns.	Admissions into Hospital.	Daily Sick, from Hospital Diets.	Deaths in India.			Invalided to be Discharged.	Ratio to Strength per Mille.				
				In Hospital.	Out of Hos- pital.	Total.		Admissions.	Daily Sick.	Deaths.		Invalided.
										In Hospital.	All Deaths.	
1864 - - -	12,412	18,745	736	179	18	197	169	1,514	59.3	14.4	15.9	13.6
1865 - - -	11,898	18,089	671	402	16	418	176	1,520	56.4	33.8	35.1	14.8

IV.—SICKNESS and MORTALITY from CLASSES of DISEASE.

						Zymotic.	Cachectic.	Local.	Developmental.	Violence.
Admissions - - - - -						12,340	354	4,035	116	1,244
Deaths - - - - -						270	31	78	4	35
<i>Per mille of Strength.</i>										
1865 -	Admissions - - - - -	-	-	-	-	1,037.1	29.8	339.1	9.7	104.6
	Deaths - - - - -	-	-	-	-	22.7	2.6	6.6	0.3	2.9
1864 -	Admissions - - - - -	-	-	-	-	1,021.0	24.3	345.1	4.0	115.6
	Deaths - - - - -	-	-	-	-	6.4	1.5	6.0	0.0	1.9

V.—SICKNESS and MORTALITY from ORDERS of DISEASE.

	Admissions.	Deaths.	Per Mille of Strength.		Ratio of Each to All, per Cent.	
			Admissions.	Deaths.	Admissions.	Deaths.
Miasmatic disease - - - - -	9,547	261	802.4	21.9	52.8	62.4
Enthetic disease - - - - -	2,401	2	201.8	0.2	13.3	0.5
Dietic disease - - - - -	270	7	22.7	0.6	1.5	1.7
Parasitic disease - - - - -	122	-	10.3	-	0.7	-
Diathetic disease - - - - -	141	4	11.9	0.3	0.8	0.9
Phthisic disease - - - - -	213	27	17.9	2.3	1.2	6.5
Disease of nervous system - - - - -	417	17	35.0	1.4	2.3	4.1
" circulatory system - - - - -	155	9	13.0	0.7	0.9	2.2
" respiratory system - - - - -	442	13	37.1	1.1	2.4	3.1
" digestive system - - - - -	1,553	36	130.5	3.0	8.6	8.6
" urinary system - - - - -	26	1	2.2	0.1	0.1	0.2
" reproductive system - - - - -	102	-	13.6	-	1.0	-
" locomotive system - - - - -	62	-	5.2	-	0.3	-
" tegumentary system - - - - -	1,218	2	102.4	0.2	6.7	0.5
Atrophic - - - - -	116	4	9.7	0.3	0.6	0.9
Violence, accidental - - - - -	1,201	28	100.9	2.3	6.6	6.7
Battle - - - - -	1	-	0.1	-	-	-
Homicide - - - - -	2	2	0.2	0.2	-	0.5
Suicide - - - - -	2	5	0.2	0.4	-	1.2
Punishment - - - - -	35	-	2.9	-	0.2	-
Unspecified - - - - -	3	-	0.3	-	-	-

VI.—SICKNESS and MORTALITY from VARIOUS DISEASES.

	Admissions.	Deaths.	Per Mille of Strength.		Ratio of Each to All, per Cent.	
			Admissions.	Deaths.	Admissions.	Deaths.
Cholera - - - - -	333	191	28.0	16.0	1.8	45.7
Small-pox - - - - -	12	2	1.0	0.2	0.1	0.5
Measles - - - - -	-	-	-	-	-	-
Dysentery - - - - -	504	19	42.4	1.6	2.7	4.6
Diarrhoea - - - - -	1,428	9	120.0	0.8	7.8	2.2
Fever, remittent and intermittent - - - - -	4,525	31	380.3	2.6	24.9	7.4
Fever of other type - - - - -	868	6	73.0	0.5	4.8	1.4
Scorbutus and purpura - - - - -	30	1	2.5	0.1	0.2	0.2
Delirium tremens - - - - -	49	6	4.1	0.5	0.2	1.4
Ebrietas - - - - -	191	-	16.0	-	1.5	-
Hydatid - - - - -	-	-	-	-	-	-
Vermes - - - - -	1	-	0.1	-	-	-
Phthisis pulmonalis - - - - -	133	18	11.2	1.5	1.7	4.3
Hepatitis - - - - -	578	26	48.6	2.2	3.2	6.2
Icterus - - - - -	69	-	5.8	-	0.4	-
Spleen disease - - - - -	58	3	4.9	0.3	0.3	0.7
All other causes - - - - -	9,310	106	782.6	8.9	51.4	25.4

VIII.—MHOW DIVISION.

		All Causes.	Cholera.	Fever.	Dysentery.	Diarrhoea.	Scurvy.	Phthisis.	Hepatitis and Icterus.	Spleen Disease.	Enthetic Disease.
DIVISION - - - - - (Mean strength, 2,832. Daily sick, 173·8.)	Admissions - -	5,097	100	2,189	144	274	5	16	106	11	549
	Deaths - - -	126	72	14	5	-	-	2	5	-	-
	<i>Ratio per mille.</i>										
	Admissions - -	1,799·8	35·3	773·0	50·8	96·8	1·8	5·6	307·4	3·9	193·9
MHOW - - - - - (Mean strength, 1,495. Daily sick, 107·3.)	Deaths - - -	44·5	25·4	4·9	1·8	-	-	0·7	1·8	-	-
	<i>Ratio per mille.</i>										
	Admissions - -	2,811	16	1,406	37	144	3	11	55	6	293
	Deaths - - -	27	9	4	4	-	-	1	1	-	-
NDORE - - - - - (Mean strength, 113. Daily sick, 3·2.)	<i>Ratio per mille.</i>										
	Admissions - -	1,879·6	10·7	940·5	24·7	96·3	2·0	7·4	36·8	4·0	196·0
	Deaths - - -	18·1	6·0	2·3	2·3	-	-	0·7	0·7	-	-
	<i>Ratio per mille.</i>										
NDORE - - - - - (Mean strength, 113. Daily sick, 3·2.)	Admissions - -	170	1	85	1	10	-	-	2	2	20
	Deaths - - -	1	-	-	-	-	-	-	-	-	-
	<i>Ratio per mille.</i>										
	Admissions - -	1,504·4	8·8	752·2	8·8	88·5	-	-	17·7	17·7	177·0
NDORE - - - - - (Mean strength, 113. Daily sick, 3·2.)	Deaths - - -	8·8	-	-	-	-	-	-	-	-	-
	<i>Ratio per mille.</i>										
	Admissions - -	1,095	65	391	55	37	1	1	12	2	75
	Deaths - - -	74	49	7	-	-	-	1	3	-	-
NDORE - - - - - (Mean strength, 465. Daily sick, 32·1.)	<i>Ratio per mille.</i>										
	Admissions - -	2,354·8	139·8	840·9	118·3	79·6	2·2	2·2	25·8	4·3	161·3
	Deaths - - -	159·1	105·3	15·0	-	-	-	2·2	6·5	-	-
	<i>Ratio per mille.</i>										
NDORE - - - - - (Mean strength, 693. Daily sick, 29·2.)	Admissions - -	895	17	256	39	64	1	4	34	1	141
	Deaths - - -	21	13	3	1	-	-	-	1	-	-
	<i>Ratio per mille.</i>										
	Admissions - -	1,291·5	24·5	369·4	56·3	92·3	1·4	5·8	49·0	1·4	203·5
NDORE - - - - - (Mean strength, 61. Daily sick, 2·0.)	Deaths - - -	30·3	18·8	4·3	1·4	-	-	-	1·4	-	-
	<i>Ratio per mille.</i>										
	Admissions - -	120	1	48	10	19	-	-	3	-	20
	Deaths - - -	3	1	-	-	-	-	-	-	-	-
NDORE - - - - - (Mean strength, 61. Daily sick, 2·0.)	<i>Ratio per mille.</i>										
	Admissions - -	1,967·2	16·4	786·9	163·9	311·5	-	-	49·2	-	327·9
	Deaths - - -	49·2	16·4	-	-	-	-	-	-	-	-
	<i>Ratio per mille.</i>										
NDORE - - - - - (Mean strength, 5. Daily sick, 0.)	Admissions - -	6	-	3	2	-	-	-	-	-	-
	Deaths - - -	-	-	-	-	-	-	-	-	-	-
	<i>Ratio per mille.</i>										
	Admissions - -	1,200·0	-	600·0	400·0	-	-	-	-	-	-
NDORE - - - - - (Mean strength, 5. Daily sick, 0.)	Deaths - - -	-	-	-	-	-	-	-	-	-	-
	<i>Ratio per mille.</i>										
	Admissions - -	1,200·0	-	600·0	400·0	-	-	-	-	-	-
	Deaths - - -	-	-	-	-	-	-	-	-	-	-

IX.—NORTHERN DIVISION.

			All Causes.	Cholera.	Fever.	Dysentery.	Diarrhea.	Scurry.	Phthisis.	Hepatitis and Icterus.	Spleen Disease.	Enthetic Disease.
DIVISION - - - - -	(Mean Strength, 1,139. Daily sick, 56.7.)	Admissions - - -	188.3	37	809	17	174	-	4	40	9	203
		Deaths - - -	43	19	5	-	1	-	-	2	-	-
		Ratio per mille.										
		Admissions - - -	1,653.2	32.5	710.3	14.9	152.8	-	3.5	35.1	7.9	178.2
MOUNT ABOO - - - - -	(Mean strength, 64. Daily sick, 2.0.)	Deaths - - -	37.8	16.7	4.4	-	0.8	-	-	1.8	-	-
		Ratio per mille.										
		Admissions - - -	92	-	58	-	6	-	-	2	-	-
		Deaths - - -	2	-	-	-	1	-	-	-	-	-
DEESA - - - - -	(Mean strength, 837. Daily sick, 38.0.)	Ratio per mille.										
		Admissions - - -	1,437.5	-	906.2	-	93.7	-	-	31.2	-	-
		Deaths - - -	31.2	-	-	-	15.6	-	-	-	-	-
		Ratio per mille.										
AHMEDABAD - - - - -	(Mean strength, 143. Daily sick, 11.5.)	Admissions - - -	1,272	3	604	9	127	-	4	30	9	170
		Deaths - - -	16	2	5	-	-	-	-	2	-	-
		Ratio per mille.										
		Admissions - - -	1,519.7	3.6	721.6	10.8	163.7	-	4.8	35.8	10.8	203.1
BARODA - - - - -	(Mean strength, 95. Daily sick, 5.2.)	Deaths - - -	19.1	2.2	6.0	-	-	-	-	2.2	-	-
		Ratio per mille.										
		Admissions - - -	325	4	80	5	23	-	-	5	-	23
		Deaths - - -	5	3	-	-	-	-	-	-	-	-
AHMEDABAD - - - - -	(Mean strength, 143. Daily sick, 11.5.)	Ratio per mille.										
		Admissions - - -	2,272.7	28.0	559.4	35.0	160.8	-	-	35.0	-	160.8
		Deaths - - -	35.0	21.0	-	-	-	-	-	-	-	-
		Ratio per mille.										
BARODA - - - - -	(Mean strength, 95. Daily sick, 5.2.)	Admissions - - -	194	30	67	3	18	-	-	3	-	10
		Deaths - - -	20	14	-	-	-	-	-	-	-	-
		Ratio per mille.										
		Admissions - - -	2,042.1	315.8	705.3	31.6	189.5	-	-	31.6	-	105.3
BARODA - - - - -	(Mean strength, 95. Daily sick, 5.2.)	Deaths - - -	210.5	147.4	-	-	-	-	-	-	-	-

X.—SIND DIVISION.

DIVISION - - - - -	(Mean strength, 1,398. Daily sick, 58.5.)	Admissions - - -	1,376	16	292	42	69	2	9	47	3	241
		Deaths - - -	29	11	2	2	2	-	1	-	-	-
		Ratio per mille.										
		Admissions - - -	984.3	11.4	208.9	30.0	49.4	1.4	6.4	33.6	2.1	172.2
KURACHEE - - - - -	(Mean strength, 1,022. Daily sick, 45.5.)	Deaths - - -	20.7	7.9	1.4	1.4	1.4	-	0.7	-	-	-
		Ratio per mille.										
		Admissions - - -	1,032	15	215	37	59	-	6	35	3	187
		Deaths - - -	26	10	10	2	2	-	1	-	-	-
HYDERABAD - - - - -	(Mean strength, 376. Daily sick, 13.0.)	Ratio per mille.										
		Admissions - - -	1,009.8	14.7	210.4	36.2	57.7	-	5.9	34.2	2.9	183.0
		Deaths - - -	25.4	9.8	9.8	2.0	2.0	-	1.0	-	-	-
		Ratio per mille.										
HYDERABAD - - - - -	(Mean strength, 376. Daily sick, 13.0.)	Admissions - - -	344	1	77	5	10	2	3	12	-	54
		Deaths - - -	3	1	-	-	-	-	-	-	-	-
		Ratio per mille.										
		Admissions - - -	914.9	2.7	204.8	13.3	26.6	5.3	8.0	31.9	-	143.6
HYDERABAD - - - - -	(Mean strength, 376. Daily sick, 13.0.)	Deaths - - -	8.0	2.7	-	-	-	-	-	-	-	-

XI.—BOMBAY BRIGADE.

		All Causes.	Cholera.	Fever.	Dysentery.	Diarrhoea.	Scurvy.	Phthisis.	Hepatitis and Icterus.	Spleen Disease.	Ethiopic Disease.
BRIGADE (Mean strength, 541. Daily sick, 39.0.)	Admissions - - -	1,204	26	385	16	191	3	18	34	-	53
	Deaths - - -	21	12	5	-	-	-	-	2	-	-
	<i>Ratio per mille.</i>										
	Admissions - - -	2,225.5	48.1	711.6	29.6	353.0	5.5	33.3	62.8	-	98.0
BOMBAY (Mean strength, 467. Daily sick, 36.5.)	Deaths - - -	38.8	22.2	9.2	-	-	-	-	3.7	-	-
	<i>Ratio per mille.</i>										
	Admissions - - -	1,113	25	355	15	182	3	17	30	-	39
	Deaths - - -	20	11	5	-	-	-	-	2	-	-
KHANDALA (Mean strength, 74. Daily sick, 2.5.)	<i>Ratio per mille.</i>										
	Admissions - - -	2,383.3	53.5	760.2	32.1	389.7	6.4	36.4	64.2	-	86.5
	Deaths - - -	42.8	23.6	10.7	-	-	-	-	4.3	-	-
	<i>Ratio per mille.</i>										
	Admissions - - -	91	1	30	-	9	-	1	4	-	14
	Deaths - - -	1	1	-	-	-	-	-	-	-	-
	<i>Ratio per mille.</i>										
	Admissions - - -	1,229.7	13.5	405.4	13.5	121.6	-	13.5	54.1	-	189.2
	Deaths - - -	13.5	13.5	-	-	-	-	-	-	-	-
	<i>Ratio per mille.</i>										
	Admissions - - -	1,089	2	193	27	73	-	7	46	4	270
BELGAUM (Mean strength, 932. Daily sick, 54.0.)	Deaths - - -	12	-	1	2	-	-	1	2	-	1
	<i>Ratio per mille.</i>										
	Admissions - - -	1,168.5	2.1	207.1	29.0	78.3	-	7.5	49.3	4.3	289.7
	Deaths - - -	12.9	-	1.1	2.1	-	-	1.1	2.1	-	1.1

XII.—BELGAUM BRIGADE.

BELGAUM (Mean strength, 932. Daily sick, 54.0.)	Admissions - - -	1,089	2	193	27	73	-	7	46	4	270
	Deaths - - -	12	-	1	2	-	-	1	2	-	1
	<i>Ratio per mille.</i>										
	Admissions - - -	1,168.5	2.1	207.1	29.0	78.3	-	7.5	49.3	4.3	289.7
	Deaths - - -	12.9	-	1.1	2.1	-	-	1.1	2.1	-	1.1
	<i>Ratio per mille.</i>										
	Admissions - - -	1,071	23	198	34	135	14	9	40	1	158
BRIGADE (Mean strength, 721. Daily sick, 34.1.)	Deaths - - -	42	11	-	1	3	1	2	5	-	1
	<i>Ratio per mille.</i>										
	Admissions - - -	1,485.4	31.9	274.6	47.2	187.2	19.4	12.5	55.5	1.4	219.1
	Deaths - - -	58.3	15.3	-	1.4	4.2	1.4	2.8	6.9	-	1.4
ADEN (Mean strength, 712. Daily sick, 34.1.)	<i>Ratio per mille.</i>										
	Admissions - - -	1,062	23	197	34	133	14	9	40	1	156
	Deaths - - -	42	11	-	1	3	1	2	5	-	1
	<i>Ratio per mille.</i>										
	Admissions - - -	1,491.6	32.3	278.1	47.8	186.8	19.7	12.7	56.2	1.4	218.0
	Deaths - - -	59.0	15.4	-	1.4	4.2	1.4	2.8	7.0	-	1.4
	<i>Ratio per mille.</i>										
	Admissions - - -	9	-	1	-	2	-	-	-	-	2
ARABIA FIELD FORCE. (For 13 weeks) (Mean weekly strength, 9. Daily sick, 0.)	Deaths - - -	-	-	-	-	-	-	-	-	-	-
	<i>Ratio per mille (yearly).</i>										
	Admissions - - -	1,000.0	-	111.1	-	222.2	-	-	-	-	222.2
	Deaths - - -	-	-	-	-	-	-	-	-	-	-

XIV.—INVALIDS AND CONVALESCENTS AT SANITARIA AND DEPÔTS.

			All Causes.	Cholera.	Fever.	Dysentery.	Diarrhoea.	Scurvy.	Phthisis.	Hepatitis and Icterus.	Spleen Disease.	Enthetic Disease.
TOTAL INVALIDS AND CONVALESCENTS												
(Mean strength, 291. Daily sick, 45·4.)												
	Admissions	- -	817	16	142	34	65	3	37	71	7	69
	Deaths	- - -	43	10	2	2	2	-	10	2	2	-
<i>Ratio per mille.</i>												
	Admissions	- -	2,786·9	55·0	488·0	116·8	223·4	10·3	127·1	244·0	24·0	237·1
	Deaths	- - -	147·8	34·4	6·9	6·9	6·9	-	34·4	6·9	6·9	-
COLABA	Admissions	- -	157	-	12	10	17	1	15	19	-	16
	Deaths	- - -	9	-	-	1	2	-	4	1	1	-
(Mean strength, 34. Daily sick, 18·0.)												
	Admissions	- -	4,617·6	-	352·9	294·1	500·0	29·4	441·2	558·8	-	482·3
	Deaths	- - -	264·7	-	-	29·4	58·8	-	117·6	29·4	29·4	-
POONA	Admissions	- -	142	-	21	15	8	-	12	9	-	17
	Deaths	- - -	10	-	-	1	-	-	4	1	-	-
(Mean strength, 48. Daily sick, 6·5.)												
	Admissions	- -	2,958·3	-	437·5	312·5	166·7	-	250·0	187·5	-	354·2
	Deaths	- - -	208·3	-	-	20·8	-	-	83·3	20·8	-	-
POORUNDHUR	Admissions	- -	240	7	54	4	26	-	-	7	-	18
	Deaths	- - -	6	3	-	-	-	-	-	-	-	-
(Mean strength, 67. Daily sick, 7·0.)												
	Admissions	- -	3,582·1	104·5	806·0	59·7	388·0	-	-	104·5	-	268·7
	Deaths	- - -	89·5	44·8	-	-	-	-	-	-	-	-
SULABUT KHAN'S TOMB. (Hot season only)	Admissions	- -	-	-	-	-	-	-	-	-	-	-
	Deaths	- - -	-	-	-	-	-	-	-	-	-	-
(Mean yearly strength, 2. Daily sick, 0.)												
	Admissions	- -	-	-	-	-	-	-	-	-	-	-
	Deaths	- - -	-	-	-	-	-	-	-	-	-	-
MOUNT ABOO	Admissions	- -	43	-	17	-	1	-	1	6	4	2
	Deaths	- - -	1	-	-	-	-	-	-	-	1	-
(Mean strength, 19. Daily sick, 1·5.)												
	Admissions	- -	2,263·2	-	894·7	-	52·6	-	52·6	315·8	210·5	105·3
	Deaths	- - -	52·6	-	-	-	-	-	-	-	-	-
DHOLIAKOTE. (For 13 weeks)	Admissions	- -	11	6	1	-	-	-	-	-	-	-
	Deaths	- - -	4	4	-	-	-	-	-	-	-	-
(Mean weekly strength, 3. Daily sick, 0·2.) (Yearly.)												
	Admissions	- -	11,000·0	6,000·0	1,000·0	-	-	-	-	-	-	-
	Deaths	- - -	4,000·0	4,000·0	-	-	-	-	-	-	-	-

XIV.—INVALIDS and Convalescents at Sanitaria and Depôts—*continued.*

		All Causes.	Cholera.	Fever.	Dysentery.	Diarrhea.	Scurvy.	Phthisis.	Hepatitis and Icterus.	Spleen Disease.	Enthetic Disease.
BULSAR - - - - - (Mean strength, 35 during 22 weeks. Daily sick, 2.5.)	Admissions -	57	-	13	-	4	-	-	3	2	2
	Deaths - - -	-	-	-	-	-	-	-	-	-	-
	<i>Ratio per mille.</i>										
	Admissions - -	3,166.7	-	722.2	-	222.2	-	-	277.8	111.1	111.1
	Deaths - - -	-	-	-	-	-	-	-	-	-	-
KURACHEE - - - - - (Mean strength, 51. Daily sick, 4.5.)	Admissions - -	94	-	12	1	3	-	7	12	1	7
	Deaths - - -	9	-	2	-	-	-	2	-	-	-
	<i>Ratio per mille.</i>										
	Admissions - -	1,843.1	-	235.3	19.6	58.8	-	137.2	235.3	19.6	137.2
	Deaths - - -	176.5	-	39.2	-	-	-	39.2	-	-	-
GHIZREE - - - - - (Mean strength, 51. Daily sick, 5.2.)	Admissions - -	73	3	12	4	6	2	2	13	-	7
	Deaths - - -	4	3	-	-	-	-	-	-	-	-
	<i>Ratio per mille.</i>										
	Admissions - -	1,431.4	58.8	235.3	78.4	117.6	39.2	39.2	254.9	-	137.2
	Deaths - - -	78.4	58.8	-	-	-	-	-	-	-	-

XV.—EFFECTIVES MARCHING.

(Mean strength, 453. Daily sick, 16.2.)	Admissions - -	537	34	170	40	32	-	-	14	2	69
	Deaths - - -	28	21	1	1	-	-	-	1	1	-
	<i>Ratio per mille.</i>										
	Admissions - -	1,185.4	75.1	375.3	88.3	70.6	-	-	30.9	4.4	152.3
	Deaths - - -	61.8	46.3	2.2	2.2	-	-	-	2.2	2.2	-

XVI.—INVALIDS AND CONVALESCENTS MARCHING.

(Mean strength, 28. Daily sick, 3.5.)	Admissions - -	47	2	5	3	1	-	6	6	-	6
	Deaths - - -	3	-	-	1	-	-	2	-	-	-
	<i>Ratio per mille.</i>										
	Admissions - -	1,678.6	71.4	178.6	107.1	35.7	-	214.3	214.3	-	214.3
	Deaths - - -	107.1	-	-	35.7	-	-	71.4	-	-	-

XVII.—SICKNESS AND MORTALITY AMONG NATIVE TROOPS.

Year.	Mean Strength from Monthly Returns.	Admissions into Hospital.	Daily Sick.	Deaths in Hospital.	Invalided to be Discharged.	Ratio to Strength per Mille.			
						Admissions.	Daily Sick.	Deaths in Hospital.	Invalided.
1865 - -	24,737	26,443	1,001	365	1,015	1,068·7	40·5	14·8	41·0

XVIII.—SICKNESS AND MORTALITY FROM CLASSES OF DISEASE.

	Zymotic.	Cachetic.	Local.	Developmental.	Violence.
Admissions - - - - -	19,028	138	4,465	114	2,698
Deaths - - - - -	270	12	61	12	10
<i>Ratio per mille.</i>					
Admissions - - - - -	769·2	5·5	180·5	4·6	109·0
Deaths - - - - -	10·9	0·5	2·5	0·5	0·4

XIX.—SICKNESS AND MORTALITY FROM ORDERS OF DISEASE.

	Admissions.	Deaths.	Per Mille of Strength.		Ratio of each to all per Cent.	
			Admissions.	Deaths.	Admissions.	Deaths.
Miasmatic Disease - - - - -	17,214	226	695·8	9·1	65·0	61·9
Enthetic. " - - - - -	597	7	24·1	0·3	2·2	1·9
Dietic " - - - - -	464	33	18·8	1·3	1·7	9·0
Parasitic " - - - - -	753	4	30·4	0·2	2·8	1·1
Diathetic " - - - - -	90	5	3·6	0·2	0·3	1·4
Phthisic " - - - - -	48	7	1·9	0·3	0·1	1·9
Disease of Nervous System - - - - -	400	12	16·2	0·5	1·5	3·3
" Circulatory " - - - - -	23	4	0·9	0·2	0·0	1·1
" Respiratory " - - - - -	409	27	16·5	1·1	1·5	7·4
" Digestive " - - - - -	1,153	15	46·6	0·6	4·3	4·1
" Urinary " - - - - -	24	1	1·0	-	0·0	0·3
" Reproductive " - - - - -	107	-	4·3	-	0·4	-
" Locomotive " - - - - -	31	1	1·3	-	1·1	0·3
" Tegumentary " - - - - -	2,318	1	93·7	-	8·7	0·3
Atrophic - - - - -	114	12	4·6	0·5	0·4	3·3
Violence Accidental - - - - -	2,690	7	108·7	0·3	10·0	1·9
Battle - - - - -	3	3	0·1	0·1	-	0·8
Homicide - - - - -	-	-	-	-	-	-
Suicide - - - - -	-	-	-	-	-	-
Punishment - - - - -	5	-	0·2	-	-	-

XX.—SICKNESS AND MORTALITY FROM VARIOUS DISEASES.

	Admissions.	Deaths.	Per Mille of Strength.		Ratio of each to all per Cent.	
			Admissions.	Deaths.	Admissions.	Deaths.
Cholera - - - - -	264	128	10·7	5·2	1·0	35·1
Small-pox - - - - -	5	-	0·2	-	-	-
Measles - - - - -	-	-	-	-	-	-
Dysentery - - - - -	568	11	23·0	0·4	2·2	3·0
Diarrhoea - - - - -	1,095	16	44·3	0·6	4·1	4·4
Fever, remittent and intermittent - - - - -	10,911	49	444·1	2·0	41·3	13·4
Fever of other type - - - - -	910	8	36·8	0·3	3·4	2·2
Scorbutus and Purpura - - - - -	462	33	18·7	1·3	1·7	9·1
Delirium Tremens - - - - -	1	-	-	-	-	-
Ebrietas - - - - -	1	-	-	-	-	-
Hydatid - - - - -	-	-	-	-	-	-
Vermes - - - - -	-	-	-	-	-	-
Phthisis Pulmonalis - - - - -	18	6	0·7	0·2	0·1	1·6
Hepatitis - - - - -	54	7	2·2	0·3	0·2	1·9
Icterus - - - - -	21	1	0·8	-	0·1	0·3
Spleen - - - - -	61	-	2·5	-	0·2	-
All other causes - - - - -	12,072	106	488·0	4·3	45·7	29·0

XXI.—POONA DIVISION.

			All Causes.	Cholera.	Fever.	Dysentery.	Diarrhoea.	Scurvy.	Phthisis.	Hepatitis and Icterus.	Spleen Disease.	Enthetic Disease.
DIVISION - - - - - (Average strength, 5,471. Daily sick, 224.)	Admissions - - -	-	6,131	69	2,595	256	298	64	8	16	2	116
	Deaths - - -	-	66	31	7	4	1	5	1	1	-	-
	Ratio per mille.											
	Admissions - - -	-	1,120.6	12.6	474.3	46.8	54.5	11.7	1.5	2.9	0.4	21.2
IRKEE - - - - - (Average strength, 167. Daily sick, 60.)	Deaths - - -	-	12.1	5.7	1.3	0.7	0.2	0.9	0.2	0.2	-	-
	Ratio per mille.											
	Admissions - - -	-	238	12	109	9	17	4	-	1	-	4
	Deaths - - -	-	5	4	-	1	-	-	-	-	-	-
POONA - - - - - (Average strength, 2,273. Daily sick, 140.0.)	Ratio per mille.											
	Admissions - - -	-	1,425.1	71.9	652.7	53.9	101.8	24.0	-	6.0	-	24.0
	Deaths - - -	-	29.9	24.0	-	6.0	-	-	-	-	-	-
	Ratio per mille.											
HOLAPOOR - - - - - (Average strength, 693. Daily sick, 13.0.)	Admissions - - -	-	3,305	14	1,368	109	195	18	5	10	-	53
	Deaths - - -	-	20	7	2	-	-	1	1	-	-	-
	Ratio per mille.											
	Admissions - - -	-	1,454.0	6.2	601.8	48.0	85.8	7.9	2.2	4.4	-	23.3
EROOR - - - - - (Average strength, 252. Daily sick, 7.0.)	Deaths - - -	-	8.8	3.1	0.9	-	-	0.4	0.4	-	-	-
	Ratio per mille.											
	Admissions - - -	-	226	-	86	16	13	-	-	-	-	3
	Deaths - - -	-	6	-	-	1	-	-	-	-	-	-
HMEDNUGGUR - - - - - (Average strength, 662. Daily sick, 22.0.)	Ratio per mille.											
	Admissions - - -	-	326.1	-	123.7	23.1	18.8	-	-	-	-	4.3
	Deaths - - -	-	8.7	-	-	1.4	-	-	-	-	-	-
	Ratio per mille.											
ALIGAUM - - - - - (Average strength, 630. Daily sick, 13.0.)	Admissions - - -	-	154	4	43	7	2	-	-	1	-	6
	Deaths - - -	-	3	-	1	1	1	-	-	-	-	-
	Ratio per mille.											
	Admissions - - -	-	611.1	15.9	170.6	27.8	7.9	-	-	4.0	-	23.8
SEERGHUR - - - - - (Average strength, 178. Daily sick, 4.0.)	Deaths - - -	-	11.9	-	4.0	4.0	4.0	-	-	-	-	-
	Ratio per mille.											
	Admissions - - -	-	567	9	238	34	17	-	2	-	1	16
	Deaths - - -	-	8	7	1	-	-	-	-	-	-	-
HOOOLIA - - - - - (Average strength, 616. Daily sick, 19.0.)	Ratio per mille.											
	Admissions - - -	-	856.5	13.6	359.5	51.4	25.8	-	3.0	-	1.5	24.2
	Deaths - - -	-	12.1	10.6	1.5	-	-	-	-	-	-	-
	Ratio per mille.											
HOOOLIA - - - - - (Average strength, 616. Daily sick, 19.0.)	Admissions - - -	-	680	17	312	34	24	4	-	4	-	8
	Deaths - - -	-	12	8	2	-	-	-	-	1	-	-
	Ratio per mille.											
	Admissions - - -	-	1,079.4	27.0	495.2	53.9	38.1	6.3	-	6.3	-	12.7
HOOOLIA - - - - - (Average strength, 616. Daily sick, 19.0.)	Deaths - - -	-	19.0	12.7	3.2	-	-	-	-	1.6	-	-
	Ratio per mille.											
	Admissions - - -	-	156	4	90	8	6	-	-	-	-	1
	Deaths - - -	-	2	2	-	-	-	-	-	-	-	-
HOOOLIA - - - - - (Average strength, 616. Daily sick, 19.0.)	Ratio per mille.											
	Admissions - - -	-	876.4	22.5	505.6	44.9	33.7	-	-	-	-	5.6
	Deaths - - -	-	11.2	11.2	-	-	-	-	-	-	-	-
	Ratio per mille.											
HOOOLIA - - - - - (Average strength, 616. Daily sick, 19.0.)	Admissions - - -	-	805	9	349	39	24	38	1	-	1	25
	Deaths - - -	-	10	3	1	1	-	4	-	-	-	-
	Ratio per mille.											
	Admissions - - -	-	1,306.8	14.6	566.6	63.3	39.0	61.7	1.6	-	1.6	40.6
HOOOLIA - - - - - (Average strength, 616. Daily sick, 19.0.)	Deaths - - -	-	16.2	4.9	1.6	1.6	1.6	6.5	-	-	-	-
	Ratio per mille.											
	Admissions - - -	-	1,306.8	14.6	566.6	63.3	39.0	61.7	1.6	-	1.6	40.6
	Deaths - - -	-	16.2	4.9	1.6	1.6	1.6	6.5	-	-	-	-

XXIII.—NORTHERN DIVISION.

			All Causes.	Cholera.	Fever.	Dysentery.	Diarrhoea.	Scurvy.	Phthisis.	Hepatitis and Icterus.	Spleen Disease.	Enthetic Disease.
DIVISION - - - - - (Average strength, 5,077. Daily sick, 150.)	Admissions - -	-	5,627	91	2,561	134	222	63	4	15	9	75
	Deaths - - -	-	97	52	5	3	4	7	2	1	-	-
	<i>Ratio per mille.</i>											
	Admissions - -	-	1,108.3	17.9	504.4	26.4	43.7	12.4	0.8	3.0	1.8	14.8
	Deaths - - -	-	19.1	10.2	1.0	0.6	0.8	1.4	0.4	0.2	-	-
SURAT - - - - - (Average strength, 607. Daily sick, 16.0.)	Admissions - -	-	648	15	298	16	28	3	-	3	-	10
	Deaths - - -	-	11	9	-	-	-	-	-	-	-	-
	<i>Ratio per mille.</i>											
	Admissions - -	-	1,067.5	24.7	490.9	26.4	46.1	4.9	-	4.9	-	16.5
	Deaths - - -	-	18.1	14.8	-	-	-	-	-	-	-	-
BROACH - - - - - (Average strength, 63. Daily sick, 2.0.)	Admissions - -	-	91	-	49	14	7	-	-	-	-	2
	Deaths - - -	-	-	-	-	-	-	-	-	-	-	-
	<i>Ratio per mille.</i>											
	Admissions - -	-	1,444.4	-	777.8	222.2	111.1	-	-	-	-	31
	Deaths - - -	-	-	-	-	-	-	-	-	-	-	-
BARODA - - - - - (Average strength, 654. Daily sick, 20.0.)	Admissions - -	-	656	8	262	22	23	2	-	-	3	11
	Deaths - - -	-	12	5	2	-	1	2	1	-	-	-
	<i>Ratio per mille.</i>											
	Admissions - -	-	1,003.1	12.2	400.6	33.6	35.2	3.1	-	-	4.6	16.8
	Deaths - - -	-	18.3	7.6	3.1	-	1.5	3.1	1.5	-	-	-
AHMEDABAD - - - - - (Average strength, 1,223. Daily sick, 23.0.)	Admissions - -	-	871	62	364	20	40	7	-	1	3	13
	Deaths - - -	-	45	35	-	2	1	2	-	-	-	-
	<i>Ratio per mille.</i>											
	Admissions - -	-	712.2	50.7	297.6	16.3	32.7	5.7	-	0.8	2.5	10.6
	Deaths - - -	-	36.8	28.6	-	1.6	0.8	1.6	-	-	-	-
DEESA - - - - - (Average strength, 868. Daily sick, 24.0.)	Admissions - -	-	1,039	-	369	10	44	5	1	2	1	9
	Deaths - - -	-	4	-	1	-	-	-	1	-	-	-
	<i>Ratio per mille.</i>											
	Admissions - -	-	1,196.9	-	425.1	11.5	50.7	5.8	1.2	2.3	1.2	10.4
	Deaths - - -	-	4.6	-	1.2	-	-	-	1.2	-	-	-
SADRA (Outpost) (Average strength, 62. Daily sick, 1.)	Admissions - -	-	66	3	23	4	6	-	-	1	-	1
	Deaths - - -	-	3	3	-	-	-	-	-	-	-	-
	<i>Ratio per mille.</i>											
	Admissions - -	-	1,064.5	48.5	370.9	64.5	96.8	-	-	16.1	-	16.1
	Deaths - - -	-	48.5	48.5	-	-	-	-	-	-	-	-

XXIV.—SIND DIVISION.

			All Causes.	Cholera.	Fever.	Dysentery.	Diarrhoea.	Scurvy.	Phthisis.	Hepatitis and Icterus.	Spleen Disease.	Enthetic Disease.
DIVISION - - - - - (Average strength, 3,442. Daily sick, 116.)	Admissions - - -	3,570	33	1,718	48	79	22	3	19	25	96	-
	Deaths - - -	37	14	5	-	1	1	1	1	-	-	-
	<i>Ratio per mille.</i>											
	Admissions - - -	1,037.2	9.6	499.1	13.9	23.0	6.4	0.9	5.5	7.3	27.9	-
KURACHEE - - - - - (Average strength, 462. Daily sick, 10.)	Deaths - - -	10.7	4.1	1.5	-	0.3	0.3	0.3	0.3	-	-	-
	<i>Ratio per mille.</i>											
	Admissions - - -	331	23	110	13	14	1	1	-	2	7	-
	Deaths - - -	16	13	1	-	-	-	1	-	-	-	-
HYDERABAD - - - - - (Average strength, 743. Daily sick, 17.)	<i>Ratio per mille.</i>											
	Admissions - - -	716.4	49.8	238.1	28.1	30.3	2.2	2.2	-	4.3	15.2	-
	Deaths - - -	34.6	28.1	2.2	-	-	-	2.2	-	-	-	-
	<i>Ratio per mille.</i>											
JACOBABAD - - - - - (Average strength, 2,237. Daily sick, 89.)	Admissions - - -	420	9	170	8	5	4	2	1	-	44	-
	Deaths - - -	3	1	-	-	-	-	-	-	-	-	-
	<i>Ratio per mille.</i>											
	Admissions - - -	565.3	12.1	228.8	10.8	6.7	5.4	2.7	1.3	-	59.2	-
	Deaths - - -	4.0	1.3	-	-	-	-	-	-	-	-	-
	<i>Ratio per mille.</i>											
	Admissions - - -	2,819	1	1,438	27	60	17	-	18	23	45	-
	Deaths - - -	18	-	4	-	1	1	-	1	-	-	-
	<i>Ratio per mille.</i>											
	Admissions - - -	1,260.2	0.4	642.8	12.1	26.8	7.6	-	8.0	10.3	20.1	-
	Deaths - - -	8.0	-	1.8	-	0.4	0.4	-	0.4	-	-	-

XXV.—BOMBAY BRIGADE.

BR. GADE - - - - - (Average strength, 2,017. Daily sick, 98.)	Admissions - - -	2,557	39	1,277	56	194	101	1	3	-	27	-
	Deaths - - -	68	15	23	2	2	9	1	1	-	1	-
	<i>Ratio per mille.</i>											
	Admissions - - -	1,267.7	19.2	633.1	27.8	96.2	50.1	0.5	1.5	-	13.4	-
BOMBAY - - - - - (Average strength, 1,690. Daily sick, 90.)	Deaths - - -	33.7	7.4	11.4	1.0	1.0	4.5	0.5	0.5	-	0.5	-
	<i>Ratio per mille.</i>											
	Admissions - - -	2,195	38	1,124	44	157	97	1	2	-	26	-
	Deaths - - -	66	14	23	2	2	9	1	1	-	1	-
TANA - - - - - (Average strength, 327. Daily sick, 8.)	<i>Ratio per mille.</i>											
	Admissions - - -	1,298.8	22.5	665.1	26.0	92.9	57.4	0.6	1.2	-	15.4	-
	Deaths - - -	39.0	8.3	13.6	1.2	1.2	5.3	0.6	0.6	-	0.6	-
	<i>Ratio per mille.</i>											
	Admissions - - -	362	1	153	12	37	4	-	1	-	1	-
	Deaths - - -	2	1	-	-	-	-	-	-	-	-	-
	<i>Ratio per mille.</i>											
	Admissions - - -	1,107.0	3.1	467.9	36.7	113.1	12.2	-	3.1	-	3.1	-
	Deaths - - -	6.1	3.1	-	-	-	-	-	-	-	-	-

XXVII.—ADEN BRIGADE.

			All Causes.	Cholera.	Fever.	Dysentery.	Diarrhoea.	Scurvy.	Phthisis.	Hepatitis and Icterus.	Spleen Disease.	Euthetic Disease.
BRIGADE - - - - - (Average strength, 1,037. Daily sick, 68.)	Admissions - -	-	1,254	11	304	40	83	153	-	1	5	61
	Deaths - - -	-	24	5	2	-	2	6	-	1	-	2
	<i>Ratio per mille.</i>											
	Admissions - -	-	1,209.3	10.6	293.2	38.6	80.0	147.5	-	1.0	4.8	58.8
DEN - - - - - (Average strength, 962. Daily sick, 64.)	Deaths - - -	-	23.1	4.8	1.9	-	1.9	5.8	-	1.0	-	1.9
	<i>Ratio per mille.</i>											
	Admissions - -	-	1,098	11	237	32	75	119	-	-	5	58
	Deaths - - -	-	20	5	1	-	2	5	-	-	-	2
ERIM - - - - - (Average strength, 75. Daily sick, 4.)	<i>Ratio per mille.</i>											
	Admissions - -	-	1,140.3	11.4	298.3	33.3	78.0	123.7	-	-	5.2	60.3
	Deaths - - -	-	20.8	5.2	1.0	-	2.1	5.2	-	-	-	2.1
	<i>Ratio per mille.</i>											
ERIM - - - - - (Average strength, 75. Daily sick, 4.)	Admissions - -	-	156	-	17	8	8	34	-	1	-	3
	Deaths - - -	-	4	-	1	-	-	1	-	1	-	-
	<i>Ratio per mille.</i>											
	Admissions - -	-	2,080.0	-	226.7	106.7	106.7	453.3	-	13.3	-	40.
ERIM - - - - - (Average strength, 75. Daily sick, 4.)	Deaths - - -	-	53.3	-	13.3	-	-	13.3	-	13.3	-	-
	<i>Ratio per mille.</i>											
	Admissions - -	-	2,080.0	-	226.7	106.7	106.7	453.3	-	13.3	-	40.
	Deaths - - -	-	53.3	-	13.3	-	-	13.3	-	13.3	-	-

XXVIII.—CHINA.

HONG KONG (for 6 months) - - - - - (Average monthly strength, 566. Daily sick, 11 (annual).)	Admissions - -	-	299	-	110	2	20	-	-	2	-	3
	Deaths - - -	-	3	-	-	-	1	-	-	-	-	-
	<i>Ratio per mille.</i>											
	Admissions - -	-	1,056.5	-	388.7	7.1	70.7	-	-	7.1	-	10.6
SHANGHAI (for 9 months) - - - - - (Average monthly strength, 677. Daily sick, 31 (annual).)	Deaths - - -	-	10.6	-	-	-	3.5	-	-	-	-	-
	<i>Ratio per mille.</i>											
	Admissions - -	-	345	-	96	5	11	-	1	-	-	81
	Deaths - - -	-	5	-	3	-	-	-	-	-	-	-
SHANGHAI (for 9 months) - - - - - (Average monthly strength, 677. Daily sick, 31 (annual).)	<i>Ratio per mille.</i>											
	Admissions - -	-	679.1	-	189.0	9.8	21.7	-	2.0	-	-	159.4
	Deaths - - -	-	9.8	-	5.9	-	-	-	-	-	-	-
	<i>Ratio per mille.</i>											

XXIX.—TROOPS MARCHING.

Average strength, 92. Daily sick - - -	Admissions - -	-	308	-	244	-	-	20	-	1	-	-
	Deaths - - -	-	-	-	-	-	-	-	-	-	-	-
	<i>Ratio per mille.</i>											
	Admissions - -	-	3,347.8	-	2,652.2	-	-	217.4	-	11.0	-	-
Average strength, 92. Daily sick - - -	Deaths - - -	-	-	-	-	-	-	-	-	-	-	-
	<i>Ratio per mille.</i>											
	Admissions - -	-	3,347.8	-	2,652.2	-	-	217.4	-	11.0	-	-
	Deaths - - -	-	-	-	-	-	-	-	-	-	-	-

DEATHS Reported in the CIVIL POPULATION of the Collectorate of *Tana* during the Year 1865.

Reported Population, 900,000. Area—Square Miles, 5,409.		Cholera.		Small-Pox.		Fever.		Bowel Complaint.		Accident or Violence.		Other Cause.		All Causes.	
RACES.		Male.	Female.	Male.	Female.	Male.	Female.	Male.	Female.	Male.	Female.	Male.	Female.	Male.	Female.
Hindoo of Caste - - -		3,385	2,953	89	67	3,004	2,327	303	183	177	113	1,330	956	8,288	6,599
Hindoo Low Caste - - -		554	468	10	8	430	319	55	18	26	26	162	114	1,237	953
Jain - - - - -		4	3	-	-	13	2	1	1	1	-	5	1	24	7
Moosulman - - - - -		183	165	6	2	163	99	10	6	7	3	65	35	434	310
Parsee - - - - -		5	4	1	-	6	3	1	2	-	-	9	3	22	12
Jew - - - - -		1	2	1	-	9	10	-	-	-	-	5	1	16	13
Christian - - - - -		106	101	17	7	54	56	11	7	5	5	88	60	281	236
Unknown Race or Caste - -		2	-	-	-	7	4	-	2	-	1	28	40	37	21
All Races and Castes - -		4,240	3,696	124	84	3,686	2,820	381	219	216	148	1,692	1,184	10,339	8,151
1865 :															
January - - - - -		299	242	11	3	421	362	46	21	18	8	226	149	1,021	785
February - - - - -		109	134	23	18	367	269	35	19	20	13	197	124	751	577
March - - - - -		215	172	18	18	420	314	34	18	14	9	204	135	905	666
April - - - - -		405	296	34	20	366	245	35	23	36	16	157	106	1,033	706
May - - - - -		1,196	1,012	11	6	188	159	21	19	14	12	126	88	1,556	1,296
June - - - - -		1,320	1,135	5	7	224	158	48	29	22	11	146	118	1,765	1,458
July - - - - -		369	323	7	4	213	142	42	28	14	11	122	88	767	596
August - - - - -		202	264	4	3	304	238	31	22	12	12	155	144	708	683
September - - - - -		47	56	2	3	307	224	33	19	18	13	122	78	529	393
October - - - - -		48	44	3	1	255	213	20	6	13	14	102	48	441	326
November - - - - -		26	18	5	1	305	228	22	7	19	13	62	52	439	314
December - - - - -		4	5	1	-	316	268	14	8	16	16	73	54	424	351
YEAR - - - - -		4,240	3,696	124	84	3,686	2,820	381	219	216	148	1,692	1,184	10,339	8,151

DEATHS Reported in the CIVIL POPULATION of the Collectorate of *Surat* during the Year 1865.

Reported Population, 792,638. Area—Square Miles, 2,919.		Cholera.		Small-Pox.		Fever.		Bowel Complaint.		Accident or Violence.		Other Cause.		All Causes.	
RACES.		Male.	Female.	Male.	Female.	Male.	Female.	Male.	Female.	Male.	Female.	Male.	Female.	Male.	Female.
Hindoo of Caste - - -		2,078	2,072	8	15	999	783	45	14	33	22	2,332	1,968	5,495	4,874
Hindoo Low Caste - - -		2,115	1,981	18	18	580	436	26	11	19	11	1,908	1,671	4,666	4,123
Jain - - - - -		26	7	1	-	5	11	-	-	-	-	24	13	56	31
Moosulman - - - - -		596	473	1	-	212	163	8	4	29	3	561	424	1,407	1,067
Parsee - - - - -		50	61	-	-	15	14	2	-	-	1	38	40	105	116
Jew - - - - -		1	-	-	-	-	-	-	-	-	-	-	-	1	-
Christian - - - - -		2	1	-	-	2	1	-	-	-	-	-	1	4	8
Unknown Race or Caste -		-	-	-	-	-	-	-	-	-	-	-	-	-	-
All Races and Castes - -		4,868	4,595	28	33	1,813	1,408	81	29	81	37	4,863	4,117	11,734	10,219
1865 :															
January - - - - -		18	11	-	-	304	267	7	1	2	1	236	177	567	457
February - - - - -		21	14	4	3	222	166	1	-	-	-	206	139	454	322
March - - - - -		132	86	1	-	394	275	10	1	3	1	281	212	821	575
April - - - - -		174	124	14	13	257	215	8	2	8	9	296	195	757	558
May - - - - -		1,320	1,329	6	4	215	200	33	13	1	3	238	192	1,813	1,741
June - - - - -		1,831	1,679	1	4	200	142	-	1	4	1	190	165	2,226	1,992
July - - - - -		912	976	1	-	11	4	-	-	23	1	516	409	1,463	1,390
August - - - - -		355	280	1	9	59	41	-	-	12	4	629	547	1,056	881
September - - - - -		81	73	-	-	58	40	-	-	10	3	521	500	670	616
October - - - - -		7	14	-	-	37	29	-	-	6	1	562	537	612	581
November - - - - -		8	4	-	-	34	18	-	-	5	8	639	601	686	631
December - - - - -		9	5	-	-	22	11	22	11	7	5	549	443	609	475
YEAR - - - - -		4,868	4,595	28	33	1,813	1,408	81	29	81	37	4,863	4,117	11,734	10,219

DEATHS Reported in the CIVIL POPULATION of the Collectorate of *Kaira*, during the Year 1865.

Reported Population, 586,606. Area—Square miles, 1,375.		Cholera.		Small Pox.		Fever.		Bowel Complaint.		Accident or Violence.		Other Cause.		All Causes.	
R A C E S.		Male.	Female.	Male.	Female.	Male.	Female.	Male.	Female.	Male.	Female.	Male.	Female.	Male.	Female.
Indoo of Caste - - -		2,620	2,021	96	93	746	612	617	474	50	51	3,427	2,632	7,556	5,883
Indoo Low Caste - - -		261	207	8	13	69	60	52	28	6	9	230	149	626	466
Sain - - - - -		14	13	-	-	2	-	3	-	-	-	11	11	30	24
Moozulman - - - -		350	314	12	19	75	48	51	33	5	4	257	201	750	619
Parsee - - - - -		-	-	-	-	-	-	-	-	-	-	10	7	10	7
Jew - - - - -		-	-	-	1	-	-	-	-	-	-	-	-	-	1
Christian - - - - -		-	-	-	-	-	-	-	-	-	-	-	-	-	-
Unknown Race or Caste -		-	-	-	-	-	-	-	-	1	-	-	-	-	1
All Races and Castes - -		3,245	2,555	116	126	892	720	723	535	61	65	3,935	3,000	8,972	7,001
1865:															
January - - - - -		-	-	18	18	80	32	55	41	4	4	305	262	412	367
February - - - - -		73	42	21	30	42	27	42	25	6	-	284	213	468	337
March - - - - -		49	31	28	26	37	19	50	47	9	8	359	258	532	389
April - - - - -		42	24	22	22	36	19	43	36	5	5	281	248	429	354
May - - - - -		403	304	13	13	15	13	42	32	7	4	319	238	799	604
June - - - - -		1,252	907	6	6	24	16	62	46	4	4	369	300	1,717	1,279
July - - - - -		914	793	3	5	40	31	78	47	8	13	374	325	1,417	1,214
August - - - - -		477	421	3	2	81	78	118	75	3	7	557	378	1,239	961
September - - - - -		27	25	-	2	52	52	80	64	7	8	474	316	640	467
October - - - - -		5	6	2	2	41	37	58	47	3	6	395	295	504	393
November - - - - -		1	2	-	-	304	248	56	42	3	2	106	71	470	365
December - - - - -		2	-	-	-	190	148	39	33	2	4	112	96	345	281
YEAR - - - - -		3,245	2,555	116	126	892	720	723	535	61	65	3,935	3,000	8,972	7,001

DEATHS Reported in the CIVIL POPULATION of the Collectorate of *Khandesh*, during the Seven Months from June to December 1865.

Reported Population, 822,476. Area—Square miles, 16,597.		Cholera.		Small Pox.		Fever.		Bowel Complaint.		Accident or Violence.		Other Cause.		All Causes.	
R A C E S.		Male.	Female.	Male.	Female.	Male.	Female.	Male.	Female.	Male.	Female.	Male.	Female.	Male.	Female.
Indoo of Caste - - -		5,681	4,684	119	88	2,556	2,086	1,113	841	195	175	1,036	938	10,700	8,812
Indoo Low Caste - - -		1,748	1,300	36	36	470	336	161	109	90	94	283	183	2,788	2,058
Sain - - - - -		13	18	1	-	5	5	2	3	1	-	2	1	24	27
Moozulman - - - -		673	472	7	2	355	301	80	74	12	8	127	134	1,254	991
Parsee - - - - -		1	-	-	-	-	-	-	-	-	-	-	-	1	-
Jew - - - - -		-	-	-	-	-	-	-	-	-	-	-	-	-	-
Christian - - - - -		-	-	-	-	-	-	-	-	1	-	-	-	1	-
Unknown Race or Caste -		8	-	-	-	-	-	-	-	-	-	-	1	8	1
All Races and Castes - -		8,124	6,474	163	126	3,386	2,728	1,356	1,027	299	277	1,448	1,257	14,776	11,889
1865:															
January - - - - -		-	-	-	-	-	-	-	-	-	-	-	-	-	-
February - - - - -		-	-	-	-	-	-	-	-	-	-	-	-	-	-
March - - - - -		-	-	-	-	-	-	-	-	-	-	-	-	-	-
April - - - - -		-	-	-	-	-	-	-	-	-	-	-	-	-	-
May - - - - -		-	-	-	-	-	-	-	-	-	-	-	-	-	-
June - - - - -		3,364	2,773	34	26	256	206	148	115	62	52	133	108	3,997	3,280
July - - - - -		2,600	2,104	32	27	683	545	313	256	69	68	361	260	4,058	3,260
August - - - - -		1,851	1,420	67	40	840	697	373	296	89	81	398	340	3,618	2,874
September - - - - -		272	155	1	3	687	542	273	220	55	56	322	349	1,610	1,325
October - - - - -		32	19	7	8	363	303	114	55	10	11	112	105	638	501
November - - - - -		2	1	3	6	335	278	80	54	5	4	60	39	485	382
December - - - - -		3	2	19	16	222	157	55	31	9	5	62	56	370	267
YEAR - - - - -		8,124	6,474	163	126	3,386	2,728	1,356	1,027	299	277	1,448	1,257	14,776	11,889

DEATHS Reported in the CIVIL POPULATION of the Collectorate of *Ahmednuggur* during the Year 1865.

Reported Population, 1,252,789. Area—Square Miles, 11,179.		Cholera.		Small-pox.		Fever.		Bowel Complaint.		Accident or Violence.		Other Cause.		All Causes.	
R A C E S.		Male.	Female.	Male.	Female.	Male.	Female.	Male.	Female.	Male.	Female.	Male.	Female.	Male.	Female.
Hindoo of Caste - - -		7,011	5,897	219	193	4,182	3,412	1,310	947	293	239	2,349	2,135	15,364	12,823
Hindoo Low Caste - - -		1,080	895	27	21	787	586	200	131	40	43	333	306	2,467	1,982
Jain - - - - -		35	16	2	-	38	16	6	4	-	1	13	13	94	50
Moosulman - - - - -		330	310	20	16	381	319	98	74	34	21	237	255	1,100	995
Parsee - - - - -		2	1	-	-	1	5	-	-	-	-	3	-	6	6
Jew - - - - -		-	-	-	-	-	-	1	2	-	-	2	1	3	3
Christian - - - - -		9	1	-	-	4	3	1	-	-	-	2	2	16	6
Unknown Race or Caste -		17	5	-	-	5	6	3	1	-	1	5	3	30	16
All Races and Castes - -		8,484	7,125	268	230	5,398	4,347	1,619	1,159	367	305	2,944	2,715	19,080	15,881
1865 :															
January - - - - -		46	42	38	38	299	275	120	82	18	15	151	182	672	634
February - - - - -		25	18	34	34	322	296	113	64	23	14	157	188	674	614
March - - - - -		116	80	49	51	377	295	120	84	16	15	178	166	856	691
April - - - - -		1,284	989	57	47	384	330	116	81	28	19	225	215	2,094	1,681
May - - - - -		2,806	2,296	31	24	276	258	144	77	25	20	209	210	3,491	2,885
June - - - - -		2,515	2,143	17	10	355	300	128	117	32	24	280	238	3,327	2,832
July - - - - -		943	885	18	7	549	446	162	131	28	39	411	396	2,111	1,904
August - - - - -		476	414	9	8	665	504	177	143	57	29	417	382	1,801	1,480
September - - - - -		198	194	7	4	592	491	180	115	42	31	364	266	1,383	1,101
October - - - - -		43	37	2	3	526	388	133	106	56	48	247	205	1,007	787
November - - - - -		26	21	3	1	568	428	119	76	22	30	169	150	907	706
December - - - - -		6	6	3	3	485	336	107	83	20	21	136	117	757	566
YEAR - - - - -		8,484	7,125	268	230	5,398	4,347	1,619	1,159	367	305	2,944	2,715	19,080	15,881

DEATHS Reported in the CIVIL POPULATION of the Collectorate of *Poona* during the Year 1865.

Reported Population, 679,429. Area—Square Miles, 5,250.		Cholera.		Small-pox.		Fever.		Bowel Complaint.		Accident or Violence.		Other Cause.		All Causes.	
R A C E S.		Male.	Female.	Male.	Female.	Male.	Female.	Male.	Female.	Male.	Female.	Male.	Female.	Male.	Female.
Hindoo of Caste - - -		3,929	3,715	73	77	4,462	3,812	510	377	96	70	1,381	1,226	10,451	9,277
Hindoo Low Caste - - -		667	530	18	12	656	564	68	41	17	3	166	122	1,592	1,272
Jain - - - - -		6	6	1	-	23	6	-	1	-	-	3	5	33	18
Moosulman - - - - -		121	135	11	3	294	224	35	22	6	4	100	82	567	470
Parsee - - - - -		-	-	-	-	4	-	-	-	-	-	1	-	5	-
Jew - - - - -		-	-	-	-	-	-	-	-	-	-	-	-	-	-
Christian - - - - -		3	-	-	-	12	5	-	-	-	-	5	4	20	9
Unknown Race or Caste -		1	1	1	1	4	2	-	-	-	-	4	-	10	4
All Races and Castes - -		4,727	4,387	104	93	5,455	4,613	613	441	119	77	1,660	1,439	12,678	11,050
1865 :															
January - - - - -		22	7	18	18	451	393	54	41	6	10	133	98	684	567
February - - - - -		27	29	15	10	402	377	33	31	11	6	118	93	606	546
March - - - - -		115	85	19	25	517	458	63	41	11	5	120	111	845	725
April - - - - -		998	818	23	15	532	419	58	48	15	11	117	111	1,743	1,422
May - - - - -		1,987	1,906	3	10	416	381	83	63	12	9	120	112	2,621	2,481
June - - - - -		937	883	5	3	442	388	64	49	13	8	191	161	1,652	1,492
July - - - - -		465	504	3	1	540	467	54	41	6	6	253	196	1,321	1,215
August - - - - -		108	113	1	2	557	410	57	41	9	3	221	162	953	731
September - - - - -		50	35	8	5	468	392	49	26	16	6	130	139	721	603
October - - - - -		14	5	4	1	383	272	32	19	14	7	91	91	538	395
November - - - - -		-	1	5	2	358	300	28	22	3	3	90	74	484	402
December - - - - -		4	1	-	1	389	356	38	19	3	3	76	91	510	471
YEAR - - - - -		4,727	4,387	104	93	5,455	4,613	613	441	119	77	1,660	1,439	12,678	11,050

DEATHS reported in the CIVIL POPULATION of the Sub-Collectorate of *Sholapoor* during the Year 1865.

Reported Population, 634,867. Area—Square Miles, 4,000.		Cholera.		Small-Pox.		Fever.		Bowel Complaint.		Accident or Violence.		Other Cause.		All Causes.	
R A C E S.		Male.	Female.	Male.	Female.	Male.	Female.	Male.	Female.	Male.	Female.	Male.	Female.	Male.	Female.
Hindoo of caste - - -		1,722	1,346	145	132	1,093	1,032	454	397	218	172	678	638	4,310	3,717
Hindoo, low caste - - -		131	105	13	18	111	98	34	23	24	15	51	36	364	295
Jain - - - - -		9	8	2	-	11	4	7	3	1	-	8	14	38	29
Moosulman - - - - -		82	62	4	6	29	45	13	20	2	10	22	20	152	163
Parsee - - - - -		1	2	-	-	-	-	-	-	-	-	-	-	1	2
Jew - - - - -		-	-	-	-	-	-	-	-	-	-	-	-	-	-
Christian - - - - -		-	3	-	-	-	-	1	1	-	-	-	-	-	4
Unknown race or caste - -		11	11	-	-	5	-	1	-	1	-	4	4	22	15
All Races and Castes - -		1,956	1,537	164	156	1,249	1,179	509	444	246	197	763	712	4,887	4,225
1865 :															
January - - - - -		5	7	25	29	123	100	30	25	30	5	50	50	263	296
February - - - - -		5	3	35	34	88	75	23	17	17	19	51	58	219	206
March - - - - -		64	54	39	24	112	110	25	20	22	17	60	59	322	284
April - - - - -		512	395	28	35	109	113	22	26	23	29	60	53	754	651
May - - - - -		725	545	3	5	99	97	33	24	21	24	66	56	947	751
June - - - - -		288	222	11	11	103	104	30	38	24	11	90	84	546	470
July - - - - -		228	164	14	6	137	110	78	44	25	13	109	81	591	418
August - - - - -		91	108	1	2	90	137	76	88	10	15	97	101	365	451
September - - - - -		31	28	1	4	121	99	80	67	16	12	82	67	331	277
October - - - - -		4	5	3	1	105	104	45	34	12	7	55	47	224	198
November - - - - -		1	6	4	5	86	83	33	36	8	6	28	45	160	181
December - - - - -		2	-	-	-	76	47	34	25	38	29	15	11	165	112
YEAR - - - - -		1,956	1,537	164	156	1,249	1,179	509	444	246	197	763	712	4,887	4,225

DEATHS reported in the CIVIL POPULATION of the Collectorate of *Satara* during the Year 1865.

Reported Population, 858,022. Area—Square Miles, 7,430.		Cholera.		Small-Pox.		Fever.		Bowel Complaint.		Accident or Violence.		Other Cause.		All Causes.	
R A C E S.		Male.	Female.	Male.	Female.	Male.	Female.	Male.	Female.	Male.	Female.	Male.	Female.	Male.	Female.
Hindoo of caste - - -		3,155	2,717	25	31	5,998	5,485	1,805	1,605	179	173	1,786	1,598	12,948	11,609
Hindoo, low caste - - -		419	333	13	11	922	781	186	158	30	17	212	194	1,782	1,494
Jain - - - - -		12	12	-	-	53	49	43	25	3	1	23	23	134	110
Moosulman - - - - -		125	91	2	3	309	250	81	71	2	8	90	79	609	532
Parsee - - - - -		1	-	-	-	6	-	-	1	1	-	2	-	10	7
Jew - - - - -		1	-	-	-	1	1	1	1	-	-	1	-	4	2
Christian - - - - -		5	-	-	-	4	1	1	-	3	-	1	1	14	2
Unknown race or caste - -		5	2	-	-	5	5	-	-	2	1	5	1	17	9
All Races and Castes - -		3,723	3,155	40	45	7,298	6,602	2,117	1,861	220	200	2,120	1,896	15,518	13,759
1865 :															
January - - - - -		5	4	15	6	497	440	99	67	16	17	183	168	815	702
February - - - - -		1	4	6	6	462	395	54	61	9	8	141	129	673	603
March - - - - -		4	6	4	13	584	536	82	67	11	14	160	141	845	777
April - - - - -		578	417	4	5	570	551	127	91	31	19	196	167	1,506	1,250
May - - - - -		1,422	1,226	5	4	655	591	202	175	17	23	244	223	2,545	2,242
June - - - - -		1,282	1,119	3	4	680	620	349	334	15	20	221	191	2,550	2,288
July - - - - -		365	315	-	3	754	684	392	381	24	19	220	203	1,755	1,605
August - - - - -		47	39	1	-	702	647	280	212	19	14	156	161	1,205	1,073
September - - - - -		7	16	-	1	787	672	201	171	19	15	161	147	1,175	1,022
October - - - - -		3	2	-	-	333	527	129	119	23	15	156	123	844	786
November - - - - -		6	-	1	-	510	487	123	111	16	17	143	120	799	735
December - - - - -		3	7	1	3	564	452	79	72	20	19	139	123	806	676
YEAR - - - - -		3,723	3,155	40	45	7,298	6,602	2,117	1,861	220	200	2,120	1,896	15,518	13,759

DEATHS reported in the CIVIL POPULATION of the Collectorate of *Kulughee* during the Year 1865.

Reported Population, 563,123. Area—Square Miles, 6,500.		Cholera.		Small-Pox.		Fever.		Bowel Complaint.		Accident or Violence.		Other Cause.		All Causes.	
RACES.		Male.	Female.	Male.	Female.	Male.	Female.	Male.	Female.	Male.	Female.	Male.	Female.	Male.	Female.
Hindoo of caste	- - -	1,310	1,134	243	220	1,376	1,037	388	303	176	116	1,037	758	4,530	3,568
Hindoo, low caste	- - -	96	97	18	10	144	116	25	23	22	6	106	93	411	345
Jain	- - -	8	1	-	2	8	6	3	1	-	-	4	5	23	15
Moosulman	- - -	198	183	20	24	166	119	47	36	24	15	92	70	547	447
Parsee	- - -	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Jew	- - -	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Christian	- - -	1	3	-	-	-	2	-	-	1	-	-	-	2	5
Unknown race or caste	- - -	8	16	3	6	9	9	6	3	1	-	3	2	30	36
All Races and Castes	- - -	1,621	1,434	284	262	1,703	1,289	469	366	224	137	1,242	928	5,543	4,416
1865 :															
January	- - -	2	1	46	33	143	93	27	14	17	14	95	72	330	227
February	- - -	4	1	33	31	129	77	14	13	17	9	86	72	282	203
March	- - -	3	1	28	29	136	101	20	20	22	14	81	57	290	222
April	- - -	226	166	28	31	183	118	36	18	26	20	119	88	618	441
May	- - -	688	628	55	40	167	136	58	43	30	14	151	91	1,149	952
June	- - -	468	443	39	33	189	159	50	27	35	11	155	129	936	802
July	- - -	193	166	7	10	147	124	37	28	10	9	146	117	540	454
August	- - -	12	15	12	10	150	133	72	66	24	12	98	63	368	299
September	- - -	21	11	1	2	102	69	26	36	16	10	83	66	249	194
October	- - -	4	1	12	18	119	87	39	37	9	9	87	68	270	217
November	- - -	1	1	17	16	131	103	48	32	8	5	79	66	284	227
December	- - -	-	-	6	9	107	88	42	32	10	10	62	39	227	178
YEAR	- - -	1,621	1,434	284	262	1,703	1,289	469	366	224	137	1,242	928	5,543	4,416

DEATHS reported in the CIVIL POPULATION of the Collectorate of *Belgaum* during the Year 1865.

Reported Population, 707,537. Area—Square Miles, 4,480.		Cholera.		Small-Pox.		Fever.		Bowel Complaint.		Accident or Violence.		Other Cause.		All Causes.	
RACES.		Male.	Female.	Male.	Female.	Male.	Female.	Male.	Female.	Male.	Female.	Male.	Female.	Male.	Female.
Hindoo of caste	- - -	516	432	157	208	2,617	1,848	187	116	57	75	1,781	1,505	5,315	4,184
Hindoo, low caste	- - -	87	72	25	30	291	228	33	23	4	4	232	167	672	524
Jain	- - -	33	10	13	19	107	73	19	11	5	4	209	132	386	249
Moosulman	- - -	53	41	37	23	275	196	15	6	8	7	165	121	553	394
Parsee	- - -	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Jew	- - -	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Christian	- - -	2	-	-	-	17	16	-	2	1	-	2	5	22	23
Unknown race or caste	- - -	1	-	10	10	34	26	2	2	1	1	46	35	94	74
All Races and Castes	- - -	692	555	242	290	3,341	2,387	256	160	76	91	2,435	1,965	7,042	5,448
1865 :															
January	- - -	1	1	25	25	316	227	23	15	5	9	204	135	579	412
February	- - -	-	-	42	38	207	273	12	18	-	4	162	168	423	501
March	- - -	-	-	59	75	367	258	24	16	7	4	219	183	676	536
April	- - -	5	-	42	63	320	225	38	11	6	5	201	168	612	472
May	- - -	107	89	26	38	348	227	19	10	18	10	250	243	768	617
June	- - -	372	254	20	28	329	228	30	16	5	10	360	280	1,116	816
July	- - -	188	189	16	7	364	246	21	21	14	19	355	255	958	737
August	- - -	16	14	2	6	257	198	22	18	5	13	216	172	518	421
September	- - -	3	8	1	2	220	127	19	9	5	5	161	127	409	278
October	- - -	-	-	-	-	62	41	2	-	2	-	14	11	80	52
November	- - -	-	-	2	-	273	187	23	17	6	8	138	115	442	327
December	- - -	-	-	7	8	278	150	18	9	3	4	155	108	461	279
YEAR	- - -	692	555	242	290	3,341	2,387	256	160	76	91	2,435	1,965	7,042	5,448

DEATHS reported in the CIVIL POPULATION of the Collectorate of *Dharwar* during the Year 1865.

Reported Population, 782,465. Area—Square Miles, 6,070.		Cholera.		Small-Pox.		Fever.		Bowel Complaint.		Accident or Violence.		Other Cause.		All Causes.	
RACES.		Male.	Female.	Male.	Female.	Male.	Female.	Male.	Female.	Male.	Female.	Male.	Female.	Male.	Female.
Hindoo of caste - - -	-	511	396	461	466	2,911	2,336	1,369	1,094	158	112	2,068	1,959	7,478	6,363
Hindoo, low caste - - -	-	69	56	70	95	450	381	221	205	17	16	276	298	1,103	1,051
Jain - - - - -	-	-	2	6	5	49	40	17	3	2	4	19	17	93	71
Moosulman - - - - -	-	88	68	91	102	388	287	160	114	30	17	271	301	1,028	889
Parsee - - - - -	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Jew - - - - -	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Christian - - - - -	-	-	-	-	-	-	-	1	-	-	-	-	-	1	-
Unknown race or caste - -	-	-	1	1	-	1	1	1	1	-	-	3	-	6	3
All Races and Castes - -	-	668	523	629	668	3,799	3,045	1,769	1,417	207	149	2,637	2,575	9,709	8,377
1865 :															
January - - - - -	-	-	-	108	112	339	235	105	84	17	11	135	150	704	592
February - - - - -	-	-	-	107	127	343	253	131	91	22	13	162	159	765	643
March - - - - -	-	-	-	118	121	352	304	148	103	17	8	207	216	842	752
April - - - - -	-	27	22	102	108	367	232	162	121	17	22	196	201	871	726
May - - - - -	-	76	62	70	67	284	245	164	144	25	12	265	253	884	783
June - - - - -	-	203	167	57	46	237	213	223	171	38	22	356	354	1,114	973
July - - - - -	-	160	129	26	42	315	244	210	147	16	13	357	327	1,084	902
August - - - - -	-	90	70	13	22	269	231	131	143	10	7	278	267	791	740
September - - - - -	-	37	17	13	10	272	217	141	115	12	8	206	182	681	549
October - - - - -	-	-	-	7	1	298	233	112	100	10	18	184	182	611	534
November - - - - -	-	52	40	5	4	363	308	120	97	7	6	165	146	712	601
December - - - - -	-	23	16	3	8	360	310	122	101	16	9	126	138	650	582
YEAR - - - - -	-	668	523	629	668	3,799	3,045	1,769	1,417	207	149	2,637	2,575	9,709	8,377

DEATHS reported in the CIVIL POPULATION of the Collectorate of *Canara* during the Year 1865.

Reported Population, 394,040. Area—Square Miles, 4,300.		Cholera.		Small-Pox.		Fever.		Bowel Complaint.		Accident or Violence.		Other Cause.		All Causes.	
RACES.		Male.	Female.	Male.	Female.	Male.	Female.	Male.	Female.	Male.	Female.	Male.	Female.	Male.	Female.
Hindoo of caste - - -	-	79	68	83	88	2,494	2,108	245	154	73	50	613	503	3,587	2,971
Hindoo, low caste - - -	-	67	59	15	18	345	336	46	48	16	6	93	92	582	559
Jain - - - - -	-	2	1	2	3	136	82	12	7	2	2	27	26	181	121
Moosulman - - - - -	-	14	7	7	4	136	104	11	4	8	2	46	47	222	168
Parsee - - - - -	-	-	-	-	-	-	1	-	-	-	-	1	-	1	1
Jew - - - - -	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Christian - - - - -	-	12	17	2	2	83	73	7	4	7	3	20	15	131	114
Unknown race or caste - -	-	1	-	-	-	13	5	-	1	1	-	3	2	18	8
All Races and Castes - -	-	175	152	109	115	3,207	2,709	321	218	107	63	803	685	4,722	3,942
1865 :															
January - - - - -	-	11	3	12	5	358	300	18	7	3	6	60	65	462	386
February - - - - -	-	5	4	4	10	280	230	30	14	8	1	55	35	382	294
March - - - - -	-	10	8	15	13	301	258	46	17	8	1	89	81	469	378
April - - - - -	-	8	7	8	14	233	175	22	14	8	4	55	61	334	275
May - - - - -	-	2	-	10	8	214	176	17	19	4	4	45	53	292	260
June - - - - -	-	19	21	12	16	225	211	25	14	10	13	66	37	357	312
July - - - - -	-	21	20	16	14	298	269	27	37	6	2	88	63	456	405
August - - - - -	-	21	14	7	14	244	223	27	20	15	9	72	69	386	349
September - - - - -	-	23	19	6	4	287	219	32	20	10	7	78	59	436	328
October - - - - -	-	30	33	5	9	235	188	30	20	15	9	58	50	373	309
November - - - - -	-	10	10	8	3	220	220	27	15	11	2	78	66	354	316
December - - - - -	-	15	13	6	5	312	240	20	21	9	5	59	46	421	330
YEAR - - - - -	-	175	152	109	115	3,207	2,709	321	218	107	63	803	685	4,722	3,942

DEATHS reported in the CIVIL POPULATION of the Collectorate of *Rutnaghery* during the Year 1865.

Reported Population, 685,372. Area—Square Miles, 5,808.		Cholera.		Small-Pox.		Fever.		Bowel Complaint.		Accident or Violence.		Other Cause.		All Causes.	
R A C E S.		Male.	Female.	Male.	Female.	Male.	Female.	Male.	Female.	Male.	Female.	Male.	Female.	Male.	Female.
Hindoo of caste - - -		727	728	141	106	4,839	4,334	475	246	133	100	1,895	1,852	8,210	7,366
Hindoo, low caste - - -		145	129	38	26	566	462	54	26	17	9	191	154	1,011	806
Jain - - - - -		1	1	-	-	13	7	1	-	-	-	8	6	23	14
Moosulman - - - - -		221	295	60	44	314	249	27	9	14	5	108	89	744	691
Parsee - - - - -		-	-	-	-	-	-	-	-	-	-	-	-	-	-
Jew - - - - -		1	-	-	-	-	-	-	-	-	-	-	-	1	-
Christian - - - - -		1	1	-	-	10	15	2	2	-	1	6	9	19	23
Unknown race or caste - -		-	-	-	-	1	1	-	-	-	-	2	-	3	1
All Races and Castes - -		1,096	1,154	239	176	5,743	5,068	559	283	164	115	2,210	2,110	10,011	8,906
1865 :															
January - - - - -		57	47	47	38	490	419	51	29	19	6	183	183	847	722
February - - - - -		35	37	48	25	445	383	57	28	9	7	153	175	747	655
March - - - - -		49	46	33	25	548	483	51	31	10	6	201	179	892	770
April - - - - -		84	79	38	29	429	367	52	19	17	7	155	144	775	645
May - - - - -		142	139	21	17	509	462	49	26	19	9	172	175	912	828
June - - - - -		311	313	15	11	489	420	42	27	16	14	153	131	1,026	916
July - - - - -		250	308	10	14	638	617	43	32	16	18	234	241	1,191	1,230
August - - - - -		71	83	5	3	534	512	38	23	11	11	207	211	866	843
September - - - - -		35	24	2	2	504	392	45	25	8	8	220	197	814	648
October - - - - -		24	29	7	5	380	370	47	13	17	8	182	163	657	588
November - - - - -		18	35	4	5	343	327	46	19	7	6	158	148	576	540
December - - - - -		20	14	9	2	434	316	38	11	15	15	192	163	708	521
YEAR - - - - -		1,096	1,154	239	176	5,743	5,068	559	283	164	115	2,210	2,110	10,011	8,906

DEATHS reported in the CIVIL POPULATION of the Collectorate of *Kurachee* during the Five Months from August to December 1865.

Reported Population, 340,000. Area—Square Miles, 19,240.		Cholera.		Small-Pox.		Fever.		Bowel Complaint.		Accident or Violence.		Other Cause.		All Causes.	
R A C E S.		Male.	Female.	Male.	Female.	Male.	Female.	Male.	Female.	Male.	Female.	Male.	Female.	Male.	Female.
Hindoo of caste - - -		61	37	-	-	161	94	8	7	9	-	32	9	271	147
Hindoo, low caste - - -		1	2	-	-	18	7	-	1	2	-	2	3	23	13
Jain - - - - -		-	-	-	-	-	-	1	-	-	-	-	-	1	-
Moosulman - - - - -		131	68	1	-	472	299	23	12	39	16	62	40	733	435
Parsee - - - - -		-	-	-	-	1	1	-	-	-	-	-	-	1	1
Jew - - - - -		-	-	-	-	-	-	-	-	-	-	1	-	1	-
Christian - - - - -		-	-	-	-	-	2	-	-	-	-	-	-	-	2
Unknown race or caste - -		-	-	-	-	-	-	-	-	1	-	-	-	1	-
All Races and Castes - -		193	107	1	-	652	403	37	20	51	16	97	52	1,031	598
1865 :															
January - - - - -		-	-	-	-	-	-	-	-	-	-	-	-	-	-
February - - - - -		-	-	-	-	-	-	-	-	-	-	-	-	-	-
March - - - - -		-	-	-	-	-	-	-	-	-	-	-	-	-	-
April - - - - -		-	-	-	-	-	-	-	-	-	-	-	-	-	-
May - - - - -		-	-	-	-	-	-	-	-	-	-	-	-	-	-
June - - - - -		-	-	-	-	-	-	-	-	-	-	-	-	-	-
July - - - - -		-	-	-	-	-	-	-	-	-	-	-	-	-	-
August - - - - -		101	68	-	-	88	52	10	6	15	4	20	11	234	141
September - - - - -		58	32	-	-	91	45	9	4	14	6	17	5	189	92
October - - - - -		27	5	-	-	104	75	9	3	11	5	15	15	166	103
November - - - - -		7	2	1	-	131	99	-	4	4	1	17	8	160	114
December - - - - -		-	-	-	-	238	132	9	3	7	-	28	13	282	148
YEAR - - - - -		193	107	1	-	652	403	37	20	51	16	97	52	1,031	598

DEATHS reported in the CIVIL POPULATION of the Collectorate of *Hyderabad* during the Six Months from July to December 1865.

Reported Population, 630,300. Area—Square Miles, 10,774.		Cholera.		Small-Pox.		Fever.		Bowel Complaint.		Accident or Violence.		Other Cause.		All Causes.	
R A C E S.		Male.	Female.	Male.	Female.	Male.	Female.	Male.	Female.	Male.	Female.	Male.	Female.	Male.	Female.
Hindoo of caste - - -	-	287	165	1	2	274	217	30	18	8	6	82	67	682	475
Hindoo, low caste - - -	-	2	2	-	-	15	8	2	1	-	-	8	5	27	16
Jain - - - - -	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Moosulman - - - - -	-	882	509	3	-	539	358	41	30	91	37	258	167	1,814	1,101
Parsee - - - - -	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Jew - - - - -	-	-	-	-	-	-	-	-	-	1	-	-	-	-	1
Christian - - - - -	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Unknown race or caste - -	-	3	-	-	-	1	1	-	-	1	-	-	-	4	2
All Races and Castes - -	-	1,174	676	4	2	829	584	73	49	99	45	348	239	2,527	1,595
1865 :															
January - - - - -	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
February - - - - -	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
March - - - - -	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
April - - - - -	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
May - - - - -	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
June - - - - -	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
July - - - - -	-	854	459	-	-	53	46	4	2	30	8	41	17	982	532
August - - - - -	-	261	172	-	-	85	65	13	10	24	15	76	43	459	305
September - - - - -	-	59	45	4	1	138	93	7	2	21	10	37	41	266	192
October - - - - -	-	-	-	-	1	145	94	1	1	12	4	34	18	192	118
November - - - - -	-	-	-	-	-	194	123	20	16	8	6	95	63	317	208
December - - - - -	-	-	-	-	-	214	163	28	18	4	2	65	57	311	240
YEAR - - - - -	-	1,174	676	4	2	829	584	73	49	99	45	348	239	2,527	1,595

DEATHS reported in the CIVIL POPULATION of the Collectorate of *Shikarpoor* during the Six Months from July to December 1865.

Reported Population, 650,304. Area—Square Miles, 9,042.		Cholera.		Small-Pox.		Fever.		Bowel Complaint.		Accident or Violence.		Other Cause.		All Causes.	
R A C E S.		Male.	Female.	Male.	Female.	Male.	Female.	Male.	Female.	Male.	Female.	Male.	Female.	Male.	Female.
Hindoo of caste - - -	-	4	3	13	6	138	143	41	38	1	2	54	40	251	232
Hindoo, low caste - - -	-	-	-	-	-	-	-	-	-	-	-	-	1	-	1
Jain - - - - -	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Moosulman - - - - -	-	16	14	5	2	122	123	56	21	8	3	46	33	253	196
Parsee - - - - -	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Jew - - - - -	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Christian - - - - -	-	-	-	-	-	-	-	1	-	-	-	-	-	1	-
Unknown race or caste - -	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
All Races and Castes - -	-	20	17	18	8	260	266	98	59	9	5	100	74	505	429
1865 :															
January - - - - -	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
February - - - - -	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
March - - - - -	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
April - - - - -	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
May - - - - -	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
June - - - - -	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
July - - - - -	-	13	10	-	-	41	34	4	1	3	2	12	8	73	55
August - - - - -	-	7	7	-	-	29	40	-	-	3	1	23	13	62	61
September - - - - -	-	-	-	-	-	39	38	2	-	1	-	8	10	50	48
October - - - - -	-	-	-	2	2	40	32	35	27	1	-	18	8	96	69
November - - - - -	-	-	-	6	1	81	77	3	2	1	-	15	8	106	88
December - - - - -	-	-	-	10	5	30	45	54	29	-	2	24	27	118	108
YEAR - - - - -	-	20	17	18	8	260	266	98	59	9	5	100	74	505	429

DEATHS reported in the CIVIL POPULATION of the Collectorate of *Upper Sind* during the Six Months from July to December 1865.

Reported Population, 47,955. Area—Square Miles, 2,147.		Cholera.		Small-Pox.		Fever.		Bowel Complaint.		Accident or Violence.		Other Cause.		All Causes.	
RACES.		Male.	Female.	Male.	Female.	Male.	Female.	Male.	Female.	Male.	Female.	Male.	Female.	Male.	Female.
Hindoo of caste	- - -	-	-	-	-	62	55	1	3	2	-	24	23	89	81
Hindoo, low caste	- - -	-	-	-	-	10	11	-	-	-	2	-	-	10	13
Jain	- - -	-	-	-	-	-	-	-	-	-	-	1	-	1	-
Moosulman	- - -	-	-	-	-	154	100	10	11	11	10	73	39	248	160
Parsee	- - -	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Jew	- - -	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Christian	- - -	-	-	-	-	-	1	-	-	-	-	-	-	-	1
Unknown race or caste	- - -	-	-	-	-	-	-	-	-	-	-	-	-	-	-
All Races and Castes	- - -	-	-	-	-	226	167	11	14	13	12	98	62	348	255
1865 :															
January	- - -	-	-	-	-	-	-	-	-	-	-	-	-	-	-
February	- - -	-	-	-	-	-	-	-	-	-	-	-	-	-	-
March	- - -	-	-	-	-	-	-	-	-	-	-	-	-	-	-
April	- - -	-	-	-	-	-	-	-	-	-	-	-	-	-	-
May	- - -	-	-	-	-	-	-	-	-	-	-	-	-	-	-
June	- - -	-	-	-	-	-	-	-	-	-	-	-	-	-	-
July	- - -	-	-	-	-	71	62	3	-	4	2	67	37	145	101
August	- - -	-	-	-	-	30	18	-	-	3	7	11	7	44	32
September	- - -	-	-	-	-	22	21	-	-	3	2	20	16	45	39
October	- - -	-	-	-	-	15	14	1	-	2	1	-	1	18	16
November	- - -	-	-	-	-	51	27	5	8	1	-	-	-	57	35
December	- - -	-	-	-	-	37	25	2	6	-	-	-	1	39	32
YEAR	- - -	-	-	-	-	226	167	11	14	13	12	98	62	348	255

DEATHS reported in the CIVIL POPULATION of *Thur* and *Parkur* during the Six Months from July to December 1865.

Reported Population, 127,035. Area—Square Miles, 13,000.		Cholera.		Small-Pox.		Fever.		Bowel Complaint.		Accident or Violence.		Other Cause.		All Causes.	
RACES.		Male.	Female.	Male.	Female.	Male.	Female.	Male.	Female.	Male.	Female.	Male.	Female.	Male.	Female.
Hindoo of caste	- - -	-	-	3	3	84	69	1	2	-	-	10	6	98	80
Hindoo, low caste	- - -	-	-	-	1	48	64	-	1	-	-	8	1	56	67
Jain	- - -	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Moosulman	- - -	-	-	-	-	58	52	2	2	-	1	27	5	87	60
Parsee	- - -	-	-	-	-	-	-	-	-	-	-	-	1	-	1
Jew	- - -	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Christian	- - -	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Unknown race or caste	- - -	-	-	-	-	-	-	-	1	-	-	5	1	5	2
All Races and Castes	- - -	-	-	3	4	190	185	3	6	-	1	50	14	246	210
1865 :															
January	- - -	-	-	-	-	-	-	-	-	-	-	-	-	-	-
February	- - -	-	-	-	-	-	-	-	-	-	-	-	-	-	-
March	- - -	-	-	-	-	-	-	-	-	-	-	-	-	-	-
April	- - -	-	-	-	-	-	-	-	-	-	-	-	-	-	-
May	- - -	-	-	-	-	-	-	-	-	-	-	-	-	-	-
June	- - -	-	-	-	-	-	-	-	-	-	-	-	-	-	-
July	- - -	-	-	-	-	-	-	-	-	-	-	4	1	4	1
August	- - -	-	-	-	-	-	-	-	-	-	-	18	7	18	7
September	- - -	-	-	-	-	9	10	1	1	-	-	14	5	24	16
October	- - -	-	-	-	-	12	14	1	-	-	1	9	1	22	16
November	- - -	-	-	-	-	98	102	1	2	-	-	1	-	100	104
December	- - -	-	-	3	4	71	59	-	3	-	-	4	-	78	66
YEAR	- - -	-	-	3	4	190	185	3	6	-	1	50	14	246	210

RETURN of CASUALTIES by VIOLENCE among the CIVIL POPULATION, reported by the Superintendents of Police in the different Collectorates of the *Bombay* Presidency during the Year 1865.

	Murder.	Homicide.			Suicide.				Killed by Wild Beasts.	Killed by Snake Bite.	Died from Hydrophobia.	Accidental Death.								Found Dead, Cause uncertain.			TOTAL.	By Drowning in Well or Tank.		Attempted Suicide.			
		Men. Women. Children.			By Drowning. In Well. In Tank.		By other Means. Men. Women.					Persons.	Persons.	Persons.	Persons.	Persons.	Persons.	Persons.	Men.	Women.	Children.	Men.		Women.	Children.	Men.	Women.	Men.	Women.
Tana	6	1	1	2	14	1	10	4	8	1	17	59	13	8	4	42	72	3	315	3	315	1	1	1	1				
Surat	9	2	1	8	14	2	5	—	5	—	2	21	24	2	1	7	66	74	1	278	1	278	1	1	1	1			
Kaira	9	3	2	6	13	—	7	7	1	3	5	18	14	1	6	25	3	65	1	251	1	251	1	1	1	1			
Ahmedabad	9	1	1	10	7	—	10	13	—	4	5	26	10	7	3	14	9	56	2	215	2	215	1	1	1	1			
Punch Mahals	2	1	2	2	1	—	7	5	1	2	3	3	—	—	—	5	1	17	—	75	—	75	1	1	1	1			
Khandesh	1	1	1	10	16	1	2	3	2	—	23	28	15	1	—	3	23	34	4	191	4	191	—	2	2	2			
Ahmednugur	—	4	—	6	15	—	2	2	1	—	—	9	21	7	—	1	6	21	—	104	—	104	—	1	1	1			
Poona	3	8	3	7	11	1	13	5	1	12	32	66	32	7	2	3	55	73	7	391	7	391	1	2	5	3			
Nasik	1	2	—	1	2	—	2	—	3	1	4	6	8	1	—	—	13	16	—	63	—	63	—	1	2	1			
Satara	8	1	1	3	18	2	8	6	60	1	22	48	34	—	4	3	47	56	1	362	1	362	—	—	4	4			
Kuludghee	5	2	1	12	19	—	20	2	2	1	9	25	19	—	—	—	7	30	4	189	4	189	—	1	1	1			
Belgaun	10	3	1	7	21	1	9	6	—	—	13	36	12	5	8	9	111	60	1	351	1	351	—	—	—	—			
Dharwar	9	1	4	2	15	6	5	12	3	1	13	15	2	23	20	24	23	50	7	314	7	314	2	2	—	—			
Canara	2	4	1	3	7	3	1	5	6	—	1	8	17	3	3	11	35	47	5	195	5	195	1	1	—	—			
Rutnagherce	4	1	1	2	4	—	7	3	5	—	1	5	11	5	5	11	56	81	3	326	3	326	—	—	—	—			
The following embrace only six months, July to December :																													
Kurachee	4	—	—	—	—	—	—	—	3	1	7	2	1	3	6	3	22	22	1	154	1	154	1	—	3	1			
Hydrabad	6	1	2	—	—	—	—	—	1	2	10	—	2	23	6	45	16	51	6	264	6	264	—	—	—	1			
Shikarpoo	8	4	2	—	—	—	—	—	1	2	—	—	3	5	6	—	50	22	—	150	—	150	—	—	—	—			
Upper Sind	2	—	—	—	—	—	—	—	—	—	—	—	—	—	2	1	7	2	1	25	1	25	—	—	—	—			
Thor and Parkur	1	—	—	—	—	—	—	—	—	—	2	—	—	—	8	—	2	398	—	458	—	458	—	1	—	1			

SICKNESS and DEATHS in GAOLS in 1865.

GAOLS.	Average Number of Prisoners.	Daily Number of Sick.	Admissions into Hospital during the Year.	Deaths from all Causes.	Deaths from										Deaths from all Causes per Mille.
					Cholera.	Small-Pox.	Fever.	Dysentery.	Diarrhoea.	Hepatitis.	Icterus.	Scorbutus.	Phthisis.	Atrophy.	
Bombay - - -	455	15.0	564	11	3	-	1	3	1	-	-	-	-	-	24.2
Surat - - -	219	5.7	215	18	4	-	4	2	3	1	-	-	1	3	82.2
Kaira - - -	290	28.0	781	14	4	-	4	-	4	-	-	-	-	1	48.3
Ahmedabad - - -	520	42.7	960	138	14	-	82	5	16	3	5	-	1	4	265.4
Rajkote - - -	48	6.7	187	1	1	-	-	-	-	-	-	-	-	-	20.8
Dohud - - -	52	6.7	156	10	-	-	6	-	1	-	-	-	-	-	192.3
Dhoolia - - -	329	14.9	368	11	2	-	-	-	1	-	-	5	-	1	33.4
Ahmednugur - - -	301	11.0	275	14	3	-	1	1	3	-	-	-	-	3	46.5
Poona - - -	354	13.8	184	23	5	-	1	6	8	1	-	-	-	2	65.0
Satara - - -	190	1.3	39	3	-	-	1	1	-	-	-	-	-	-	15.8
Kolhapoor - - -	105	5.7	142	4	-	-	2	-	2	-	-	-	-	-	38.1
Sholapoor - - -	156	11.4	188	3	-	-	-	-	-	-	-	-	-	-	19.2
Kuludghee - - -	50	4.0	147	-	-	-	-	-	-	-	-	-	-	-	-
Dharwar - - -	529	15.9	352	7	2	-	1	1	2	-	-	-	-	1	13.2
Honore - - -	174	9.1	407	11	7	-	1	2	1	-	-	-	-	-	63.2
Sawuntwaree - - -	36	2.9	70	-	-	-	-	-	-	-	-	-	-	-	-
Rutnagheree - - -	256	13.4	455	8	-	-	1	-	3	-	-	-	-	-	31.2
Tana - - -	333	31.3	597	17	2	-	1	4	-	-	-	2	-	-	51.1
Kurachee - - -	489	22.6	430	18	1	-	2	-	11	-	-	-	-	-	36.8
Hydrabad - - -	405	19.2	883	104	8	-	22	11	48	-	-	2	-	-	256.8
Shikarpoor - - -	617	16.8	630	18	-	-	9	-	2	-	-	-	-	2	29.2
Aden - - -	136	8.7	309	5	2	-	-	-	-	-	1	1	-	-	36.8
TOTAL - - -	6,044	306.8	8,339	438	58	-	139	36	106	5	6	10	2	17	72.4
Subsidiary Gaols, Gangs, and Lock-ups.															
Yerowda - - -	376	23.3	648	27	6	-	12	3	2	-	-	-	-	2	71.8
Thuggee Gaol - - -	57	1.3	31	5	2	-	1	1	1	-	-	-	-	-	87.7
Bukur - - -	73	7.2	228	5	-	-	2	1	-	-	-	-	-	-	68.5
Karwar - - -	173	6.7	326	1	-	-	-	-	-	-	-	-	-	-	5.8
Thur and Parkur - - -	137	9.4	561	1	-	-	1	-	-	-	-	-	-	-	7.3
Metro Canal - - -	122	6.6	288	10	-	-	5	1	2	-	-	-	-	-	82.0
Sadra - - -	3	0.9	7	-	-	-	-	-	-	-	-	-	-	-	-
Ranjughah - - -	34	2.8	45	1	-	-	1	-	-	-	-	-	-	-	29.4
TOTAL - - -	975	58.2	2,134	50	8	-	22	6	5	-	-	-	-	2	51.2

A P P E N D I X.

APPENDIX I.

ANALYSES OF WATERS.

KIRKEE.				In Imperial Gallon.	POONA—continued.				In Imperial Gallon.
WATER from Moola River.					WATER from Mootā Moola River—continued.				
Drawn 26th January 1865 :				Grs.	Drawn 8th February 1865 :				Grs.
Specific gravity	-	-	-	1000·17	Specific gravity	-	-	-	1000·19
Organic matter	-	-	-	-	Organic matter	-	-	-	1·99
Chlorine	-	-	-	-	Chlorine	-	-	-	·72
Total Solids	-	-	-	13·16	Total Solids	-	-	-	10·08
Drawn 3rd March :					FROM Mootā River above the City Bund.				
Specific gravity	-	-	-	1000·12	Drawn on the 30th January :				
Organic matter	-	-	-	1·83	Specific gravity	-	-	-	1000·15
Chlorine	-	-	-	·80	Organic matter	-	-	-	4·97
Total Solids	-	-	-	10·03	Chlorine	-	-	-	·85
Drawn 6th April :					Total Solids	-	-	-	8·96
Specific gravity	-	-	-	1000·27	Drawn 3rd March :				
Organic matter	-	-	-	1·86	Specific gravity	-	-	-	1000·12
Chlorine	-	-	-	·99	Organic matter	-	-	-	2·41
Total Solids	-	-	-	10·50	Chlorine	-	-	-	·97
Drawn 9th May :					Total Solids	-	-	-	10·71
Specific gravity	-	-	-	1000·22	Drawn 6th April :				
Organic matter	-	-	-	1·60	Specific gravity	-	-	-	1000·24
Chlorine	-	-	-	·80	Organic matter	-	-	-	2·36
Total Solids	-	-	-	10·57	Chlorine	-	-	-	1·09
Drawn 16th June :					Total Solids	-	-	-	10·36
Specific gravity	-	-	-	1000·17	Drawn 9th May :				
Total solids	-	-	-	6·65	Specific gravity	-	-	-	1000·33
Chloride	-	-	-	·59	Organic matter	-	-	-	1·89
Lime calculated as carbonate	-	-	-	2·99	Chlorine	-	-	-	·54
Magnesia - ditto	-	-	-	·84	Total Solids	-	-	-	11·48
Organic matter	-	-	-	1·46	Drawn June :				
Clark's degrees of hardness	-	-	-	3·9	Specific gravity	-	-	-	1000·13
POONA.					Total solids	-	-	-	10·60
WATER from Mootā Moola River below the City Bund.					Chloride	-	-	-	·67
Drawn 9th January 1865 :					Lime calculated as carbonate	-	-	-	3·39
Specific gravity	-	-	-	1000·25	Magnesia - ditto	-	-	-	·95
Organic matter	-	-	-	2·89	Organic matter	-	-	-	4·69
Chlorine	-	-	-	·99	Clark's degrees of hardness	-	-	-	4·4
Total Solids	-	-	-	8·40					

ANALYSES OF WATERS—continued.

POONA—continued.				In Imperial Gallon.	POONA CANTONMENT—continued.				In Imperial Gallon.
From the Moota Moola River near the Jamsetjee Bund.					WATER from the Well, &c.—continued.				
Drawn 7th March :				Grs.					Grs.
Specific gravity	-	-	1000·21		Carbonate of soda	-	-	-	3·51
Organic matter	-	-	-	2·13	Carbonate of lime	-	-	-	3·11
Chlorine	-	-	-	·98	Carbonate of magnesia	-	-	-	4·11
Total Solids				12·04	Carbonate of iron	-	-	-	·37
					Silica	-	-	-	5·11
					Organic matter	-	-	-	·98
Drawn 6th April :					Total Solids				21·02
Specific gravity	-	-	1000·33	1·92	Total Solids by evaporation				22·54
Organic matter	-	-	-	·94	Clark's degrees of hardness				10·9
Chlorine	-	-	-						
Total Solids				9·52					
Drawn 9th May :					WATER from the Conduit that supplies the Artillery and Infantry Wunouree Barracks.				
Specific gravity	-	-	1000·29	2·61	Drawn 9th June :				
Organic matter	-	-	-	·80	Specific gravity	-	-	1000·42	
Chlorine	-	-	-		Sulphate of lime	-	-	-	·33
Total Solids				11·34	Chloride of calcium	-	-	-	1·63
					Nitrate of lime	-	-	-	·61
Drawn June :					Nitrate of magnesia	-	-	-	·21
Specific gravity	-	-	1000·32	14·97	Carbonate of soda	-	-	-	5·12
Total solids	-	-	-	·57	Carbonate of lime	-	-	-	6·80
Chloride	-	-	-	4·74	Carbonate of magnesia	-	-	-	2·43
Lime calculated as carbonate	-	-	-	1·05	Carbonate of iron	-	-	-	·20
Magnesia ditto	-	-	-	2·20	Silica	-	-	-	7·49
Organic matter	-	-	-		Organic matter	-	-	-	·85
Clark's degrees of hardness				5·8	Total Solids				25·67
					Total Solids by evaporation				23·38
					Clark's degrees of hardness				12·7
POONA CANTONMENT.									
WATER from Bamkee Baoree in the Gorpooree Lines.					WATER from the Nulla Well near the Site of the New Central Gaol at Yellowda, near Poona.				
Drawn 20th May :					Drawn 3rd July :				
Specific gravity	-	-	1000·66	·79	Specific gravity	-	-	1000·45	
Sulphate of lime	-	-	-	·53	Carbonate of calcium	-	-	-	·06
Sulphate of magnesia	-	-	-	·53	Nitrate of lime	-	-	-	·66
Nitrate of magnesia	-	-	-	·46	Chloride of sodium	-	-	-	3·04
Chloride of magnesia	-	-	-	7·00	Carbonate of soda	-	-	-	4·04
Chloride of sodium	-	-	-	1·68	Carbonate of lime	-	-	-	7·77
Carbonate of soda	-	-	-	11·23	Carbonate of magnesia	-	-	-	·69
Carbonate of lime	-	-	-	4·64	Carbonate of iron	-	-	-	·27
Carbonate of magnesia	-	-	-	·30	Silica	-	-	-	2·38
Carbonate of iron	-	-	-	3·36	Organic matter	-	-	-	·70
Silica	-	-	-	·34	Total Solids				19·61
Organic matter	-	-	-		Total Solids by evaporation				23·17
Total Solids				30·86	Clark's degrees of hardness				9·0
Total Solids by evaporation dried at 550°				30·24					
Hardness Clark's scale				19·0					
WATER from the Well in the Staff Lines, near to the Sappers' Lines.					ASEERGHUR.				
Drawn 9th June :					WATER from Sukur Baoree which supplies the European Troops.				
Specific gravity	-	-	1000·45	·86	Drawn 14th March :				
Sulphate of lime	-	-	-	·13	Specific gravity	-	-	1000·31	
Chloride of calcium	-	-	-	2·51	Organic matter	-	-	-	1·27
Nitrate of magnesia	-	-	-	·33	Chlorine	-	-	-	2·14
Nitrate of soda	-	-	-		Total Solids				26·04

ANALYSES OF WATERS—continued.

ASEERGHUR—continued.				In Imperial Gallon.	KURACHEE.				In Imperial Gallon.
WATER from No. 1 Tank which filters into the Sukur Baoree.				Grs.	WATER from No. 1 Commissariat Well, which supplies the Artillery and Dépôt Lines, and all the Hospitals, with the exception of that of the European Infantry.				Grs.
Drawn 14th March :					Drawn 27th April :				
Specific gravity	-	-	-	1000·27	Specific gravity	-	-	-	1001·01
Organic matter	-	-	-	2·53	Sulphate of lime	-	-	-	1·85
Chlorine	-	-	-	3·18	Sulphate of magnesia	-	-	-	2·81
Total Solids	-	-	-	20·23	Chloride of magnesium	-	-	-	·58
					Chloride of sodium	-	-	-	40·95
					Carbonate of lime	-	-	-	10·64
					Carbonate of magnesia	-	-	-	1·16
					Carbonate of iron	-	-	-	·24
					Silica	-	-	-	2·31
					Organic matter	-	-	-	·66
					Total Solids	-	-	-	61·20
					Total Solids by evaporation	-	-	-	(all expended)
					Clark's degrees of hardness	-	-	-	16·4
WATER from Tank No. 2.					No trace of nitric acid.				
Drawn 14th March :					No. 2 Well which supplies the Shipping at Munora and Keamaree Bundur.				
Specific gravity	-	-	-	1000·35	Drawn 27th April :				
Organic matter	-	-	-	4·16	Specific gravity	-	-	-	1001·11
Chlorine	-	-	-	4·17	Sulphate of lime	-	-	-	4·63
Total Solids	-	-	-	10·17	Sulphate of magnesia	-	-	-	4·10
					Chloride of magnesium	-	-	-	1·13
					Chloride of sodium	-	-	-	54·87
					Carbonate of lime	-	-	-	14·61
					Carbonate of magnesia	-	-	-	1·64
					Carbonate of iron	-	-	-	·43
					Silica	-	-	-	3·85
					Organic matter	-	-	-	·66
					Total Solids	-	-	-	85·92
					Total Solids by evaporation	-	-	-	86·59
					Clark's degrees of hardness	-	-	-	24·6
WATER from Tank No. 3, or Mess Tank.					No trace of nitric acid.				
Drawn 14th March :					No. 3 WELL which supplies the Napier Barracks.				
Specific gravity	-	-	-	1000·14	Drawn 27th April :				
Organic matter	-	-	-	2·70	Specific gravity	-	-	-	1000·80
Chlorine	-	-	-	1·76	Sulphate of lime	-	-	-	·92
Total Solids	-	-	-	18·06	Sulphate of magnesia	-	-	-	1·28
					Chloride of sodium	-	-	-	24·70
					Sulphate of soda	-	-	-	4·32
					Carbonate of lime	-	-	-	9·46
					Carbonate of magnesia	-	-	-	1·64
					Carbonate of iron	-	-	-	·20
					Silica	-	-	-	2·38
					Organic matter	-	-	-	·61
					Total Solids	-	-	-	45·51
					Total Solids by evaporation	-	-	-	47·95
					Clark's degrees of hardness	-	-	-	13·2
AHMEDNUGUR.					No trace of nitric acid.				
WATER from the Bhingar Aqueduct, used by European Troops.									
Drawn 12th April :									
Specific gravity	-	-	-	1000·45					
Chloride of sodium	-	-	-	1·00					
Sulphate of lime	-	-	-	·10					
Silicate of soda	{ Soda	-	-	3·10					
	{ Silicic acid	-	-	4·41					
Carbonate of lime	-	-	-	7·99					
Carbonate of magnesia	-	-	-	2·52					
Carbonate of iron	-	-	-	·43					
Organic matter	-	-	-	·14					
Total Dry Solids	-	-	-	19·73					
Water of hydration of silicate not expelled at 350°	-	-	-	2·95					
Total Solids by evaporation mean of three experiments 23·17, 22·47, 22·40	-	-	-	22·68					
Total Solids by evaporation dried at about 650°	-	-	-	20·88					

ANALYSES OF WATERS—continued.

DEESA.				In Imperial Gallon.	DEESA—continued.				In Imperial Gallon.
WATER from the Well which supplies the Barracks of the European Infantry Regiment (the Well is 17 Yards from the nearest Barrack).				Grs.	WATER from the Well which supplies the Royal Artillery Barracks (117 yards from the nearest Barrack).				Grs.
Drawn 1st April.					Drawn 17th April :				
Specific gravity	-	-	-	1000·24	Specific gravity	-	-	-	1000·44
Sulphate of lime	-	-	-	1·01	Sulphate of lime	-	-	-	·86
Sulphate of magnesia	-	-	-	·36	Chloride of calcium	-	-	-	1·12
Nitrate of magnesia	-	-	-	·78	Chloride of magnesia	-	-	-	·30
Nitrate of soda	-	-	-	2·48	Chloride of sodium	-	-	-	2·75
Chloride of sodium	-	-	-	5·77	Carbonate of soda	-	-	-	3·08
Carbonate of lime	-	-	-	20·95	Carbonate of lime	-	-	-	8·03
Carbonate of magnesia	-	-	-	1·58	Carbonate of magnesia	-	-	-	2·85
Carbonate of iron	-	-	-	·22	Carbonate of iron	-	-	-	·30
Silica	-	-	-	1·75	Silica	-	-	-	4·13
Organic matter	-	-	-	1·75	Organic matter	-	-	-	1·44
Total Solids	-	-	-	36·65	Total Solids	-	-	-	24·86
Total Solids by evaporation	-	-	-	(expended)	Total Solids by evaporation	-	-	-	(expended)
Clark's degrees of hardness	-	-	-	23·4	Clark's degrees of hardness	-	-	-	13·4
WATER from the Well which supplies the Hospital of the European Infantry Regiment (the Well is 29½ Yards from the Hospital Building).					MOUNT ABOO.				
Drawn 27th April 1865 :					WATER from the new Well (64 Yards distant from the nearest Barrack).				
Specific gravity	-	-	-	1000·59	Drawn 7th April 1865 :				
Sulphate of lime	-	-	-	·62	Specific gravity	-	-	-	1000·25
Nitrate of soda	-	-	-	2·80	Sulphate of lime	-	-	-	·29
Sulphate of soda	-	-	-	2·75	Chloride of calcium	-	-	-	·44
Chloride of sodium	-	-	-	7·22	Chloride of sodium	-	-	-	1·52
Carbonate of lime	-	-	-	13·31	Carbonate of soda	-	-	-	1·27
Carbonate of magnesia	-	-	-	2·66	Carbonate of lime	-	-	-	3·48
Carbonate of iron	-	-	-	·32	Carbonate of magnesia	-	-	-	·24
Silica	-	-	-	4·27	Carbonate of iron	-	-	-	·27
Organic matter	-	-	-	2·34	Silica	-	-	-	1·54
Total Solids	-	-	-	36·29	Organic matter	-	-	-	·59
Total Solids by evaporation	-	-	-	36·75	Total Solids	-	-	-	9·64
Clark's degrees of hardness	-	-	-	16·9	Total Solids by evaporation	-	-	-	10·64
WATER from the Well which supplies the Royal Artillery Hospital (61 Yards distant).					Clark's degrees of hardness	-	-	-	4·4
Drawn 17th April :					BARODA.				
Specific gravity	-	-	-	1000·51	WATER from the Well near the Artillery Hospital.				
Sulphate of lime	-	-	-	1·02	Drawn 23rd May :				
Chloride of calcium	-	-	-	·71	Specific gravity	-	-	-	1001·1
Chloride of magnesia	-	-	-	1·07	Chloride of sodium	-	-	-	9·47
Chloride of sodium	-	-	-	2·47	Sulphate of soda	-	-	-	1·94
Carbonate of soda	-	-	-	3·62	Nitrate of soda	-	-	-	11·79
Carbonate of lime	-	-	-	9·34	Carbonate of soda	-	-	-	2·63
Carbonate of magnesia	-	-	-	2·00	Carbonate of lime	-	-	-	8·20
Carbonate of iron	-	-	-	·30	Carbonate of magnesia	-	-	-	14·75
Silica	-	-	-	3·36	Silica	-	-	-	4·20
Organic matter	-	-	-	1·44	Organic matter	-	-	-	·68
Total Solids	-	-	-	25·33	Total Solids	-	-	-	53·56
Total Solids by evaporation	-	-	-	26·95	Total Solids by evaporation	-	-	-	53·76
Clark's degrees of hardness	-	-	-	14·2	Clark's degrees of hardness	-	-	-	25·7

ANALYSES OF WATERS—continued.

BARODA—continued.		SATARA.	
WATER from the Well from which Drinking Water for the Artillery Barracks is obtained.		WATER from the Well used by the Sick in Hospital.	
Drawn 23rd May :		Drawn 15th April :	
Specific gravity - - - - -	1001·7	Specific gravity - - - - -	1000·5
Chloride of sodium - - - - -	8·44	Organic matter - - - - -	0·13
Sulphate of soda - - - - -	·54	Chloride - - - - -	1·24
Nitrate of soda - - - - -	4·00		
Carbonate of soda - - - - -	26·13	Total Solids - -	24·21
Carbonate of lime - - - - -	4·18		
Carbonate of magnesia - - - - -	5·17	Clark's degrees of hardness - -	14·0
Silica - - - - -	2·87		
Organic matter - - - - -	1·08		
Total Solids - -	52·41	WATER from Well in the Government Garden used by the Troops in Barracks.	
Total Solids by evaporation - -	50·12	Drawn 15th April :	
Clark's degrees of hardness - -	10·3	Specific gravity - - - - -	1000·7
		Organic matter - - - - -	0·21
		Chlorine - - - - -	·54
		Total Solids - -	20·25
		Clark's degrees of hardness - -	15·7

Appendix II.

REPORT on the WATER SUPPLY of the CANTONMENTS of POONA and KIRKEE.

THE cantonment of Poona is on undulating ground, and at a distance varying from five furlongs to three miles from the Moota Moola River, into which the surface drainage of all the regimental lines naturally flows by watercourses which join it below the Jamsetjee Bund. The bund is 14 feet high, and the lines of the officers of the infantry at Wanouree, three miles distant, are at an elevation of 225 feet above its top, and the officers' lines at Gorpooree, above the lowest point of the cantonment, have an elevation of 67 feet. The river has but little water in it below the bund at any time, excepting when heavy rain is falling at its sources; and therefore the fall may be reckoned to its bed rather than to the top of the bund, and so reckoning it, there is a fall from all this part of the cantonment of about 80 feet in a mile.

2. The Sudder Bazar has its drainage into the Moota River, about a mile distant, and with a fall of about 76 feet, reckoned from the surface of the water when the sluices at the Jamsetjee Bund are closed. The rapidity with which the water must flow off, with a fall so great as is here shown, is unfavourable to the feeding of the wells.

3. The ground is in great part gravelly, with rock protruding in some places, and where there is soil it is seldom more than a foot or two deep. No cultivation is allowed in the cantonment, except in the gardens of the soldiers and in those round officers' bungalows.

4. The rock is igneous, a dolerite lying in nearly horizontal beds, which vary considerably in lithological character, some being a compact stone containing a few nodules or geodes of agate or quartz, others being amygdaloidal, and more or less rich in imbedded hydrous silicates, chiefly stilbite, scolecite or poonalite, and apophyllite.

5. The wells are as usual in depressions of the ground, as in such situations water is found nearer the surface than it is elsewhere. They are all excavated in the solid rock, and have the upper few feet of gravel lined with stone masonry; and being open draw wells from 10 to 34 feet in diameter, they are surrounded with a stone parapet wall; the ground around them is paved with stone.

6. There are 36 Government wells in the Poona cantonment to supply the various corps, and there is an aqueduct which conveys water to reservoirs in the Wanouree lines from Government wells near the village of Kondwa, about four miles distant.

7. The cantonment walls vary in depth from 30 to 67 feet. They give water in limited quantity, and only during part of the year. They are fed by the infiltration of the rain that falls in their near neighbourhood, and a year of partial drought has always been followed by much privation. Most of them dry up in ordinary years before or at the beginning of the hot season. In 1864 the rainfall was but 16½ inches, or only about two-thirds of the average annual fall, which in 20 years has been 25 inches, and in consequence all the wells failed last hot season, excepting one in the Native infantry lines, one in the Sappers' field practice ground, one in the Gorporee lines, and those supplying the conduit from Kondwa, which continued to give a very small quantity. It is not an unusual thing to have so scanty a fall of rain, as it has happened five times in the last 20 years; on three of those occasions the quantity noted was even less than it was last year.

8. There are 20 wells in the Poona cantonment bazars, apart from those from which the troops are supplied, and they vary in depth from 35 to 64 feet. Two of these wells give water during all the year, but it is not drinkable; the other 18 fail in February or March; and this was the case in 1864, although the rainfall of the preceding year had been only two and a quarter inches less than the average.

9. The European troops have at all times had a very insufficient supply of water in their lavatories, and even if these had been furnished with baths, they could not have been filled. There is an expensively constructed plunge-bath in the Wanouree artillery lines, that has not been used for many years, owing to the want of water. There is a plunge-bath in the Gorporee lines also, which in years with a fall of rain not under the average, has been used about seven months in the year; but it has been useless during the remaining five, including the hot season.

10. The Native cavalry located beyond Gorporee, and near the river, with a view to afford facility for watering the horses, have undergone much inconvenience, expense, and privation this year, owing to the expected supply from the river having failed. The river ceased to flow, and the men had to purchase the use of wells from the cultivators in the fields, at a greater or less distance from their lines.

11. The commissariat cattle have generally to be taken in the hot weather to the river, about three miles distant, when the tanks and wells dry up.

12. Fifteen years ago a masonry dam was built across the Moota Moola River, and an engine was erected to raise the ponded water to be delivered by pipe to the Sudur Bazar, to relieve the distress that was experienced every year by the inhabitants through the failure of the wells. This supply had been continued yearly to the bazar population, and as the water was bad, it was not desired by the other inhabitants of the cantonment, while they had even the scanty supply that their wells afforded. This year, however, the river water had to be distributed more largely, and the Native troops were almost wholly dependent on it for all purposes.

13. The Jamsetjee Bund was unfortunately built below the city instead of above it, where the impounded water would have been comparatively pure; now the water is impure before it is ponded.

14. The river, which is the conjoined Moota, Moola, and Powna, has a large body of water in the rains, and at other seasons there are occasional freshets in it, when rain has fallen on the hills where its sources lie. When in full stream, it can contain but little impurity in solution, although it carries much earthy matter in suspension; but in the dry season, when the stream is small, the water becomes impure, as might be expected, from its passing many villages in its upper course, and then the cantonment of Kirkee and the city of Poona, where much of the filth of the town passes into it. The sewage, indeed, was intercepted during last dry season, but there are no practicable means of preventing the accumulated filth of the surface gutters from being washed into the river after a fall of rain. Besides intercepting the sewage, special policemen were employed along the banks of the river, both at and above their confluence, to prevent washing, or bathing, or throwing of filth into the water, and unceasing efforts were made to keep it from defilement.

15. The water, before it was raised at the Jamsetjee Bund, used to pass through a filter, but this has been inefficient for some years, and it would have been too small this year, even if in use, to have filtered the unusually large quantity that was distributed.

16. The water was analysed at intervals of a month during the time it was being used in the cantonment, and was found to have from two to three and a half grains of organic matter in solution; and under the microscope the unfiltered water was seen to contain many animalcules.

17. The quantity of the water from different wells differs, as might be expected, from these being sunk in trapean beds of different mineralogical character, some having in their own composition, or in that of their contained minerals, more or less of lime, or soda, or potass, and yielding on their decomposition more or less of soluble salts.

18. Of the 20 wells in the bazars, there are only nine that give drinking water, and these fail in February or March. The water of the other 11 is too strongly saline to allow of its being used for drinking or cooking.

19. The

19. The water of the rest of the cantonment, or that part which has its natural drainage to the Moota Moola, and which is occupied by the troops, is of better quality. It is very hard, but it is liked by those who use it, and by chemical analysis it is found to contain but a trifling amount of organic impurity. The results of analysis of samples of the waters taken from the well and the conduit supplying the European troops, that did not altogether dry up, and which were drawn at the close of the hot season, show that the Gorpoooree well had a total amount of 30.24 grains of solids in a gallon, with hardness according to Clark's scale, of 19, but only 0.34 grain of organic matter in the gallon. The water of the Wanouree conduit had in solution 23.38 grains in a gallon of solid matter and 0.73 grain of organic matter.

20. Kirkee cantonment is close to the Moola River, and at the distance of a quarter of a mile from its confluence with the Moota. The rock on which it stands is of the same nature as that at Poona. The supply of water is even more unsatisfactory than that of the Poona cantonment. There are seven Government wells, varying in depth from 36 to 89 feet. They usually give drinking water for several months after the rains, but fail at the beginning of the hot season, when the river water has to be resorted to. This year, owing to the scanty rainfall in 1864, the river water had to be used throughout the twelve months. The plunge-bath at Kirkee is never used because of the want of water.

21. The Moola nearly ceases to flow in the hot season, and then the water lies in foul stagnant pools in its bed. This year, owing to the height of the Jamsetjee Bund being temporarily raised, the impounded water reached back to the Kirkee cantonment. Chemical analysis showed the amount of organic impurity in it to range from about one and a half to four grains in a gallon.

22. It is highly desirable that a more constant and a much more copious supply than there is now, of good water, should be afforded to the cantonments of Poona and Kirkee—not only to the troops, but also to the followers and to the inhabitants of the bazars. It is demanded not only for the greater reason of common humanity, that these also should be preserved from what is injurious to their health, but the welfare of the troops, with whom they live in so close neighbourhood, also requires that the followers should be kept free from all such communicable diseases as might be caused or fostered by the drinking of impure water, or by the want of cleanliness that its scanty supply occasions.

23. It is obvious from past experience, that no constant and adequate supply of water is to be obtained by multiplying wells. It is manifest also that pure water cannot be got from the river when it passes the populous city of Poona, and it is at great risk to health that the river water is now used. The Municipal Commissioners of Poona are so well aware of the evil that results from drinking the river water in the dry and hot seasons, when it has ceased to flow, that they are now engaged in procuring an increased supply from a purer source, so as to render the inhabitants of the town independent of the ponded water of the Moota.

24. It is most desirable that water should be obtained for the cantonment from the hills, where the rainfall is more copious and more to be depended on, than it is on the plain on which the cantonment stands. If the water collected on the hills, or from streams near their sources on the hills, be stored in sufficient bulk, it may be kept pure, and it will be free from the objectionable hardness that the well water has; and at the same time it may be supplied by gravitation in drinking fountains, in lavatories, and in baths to the barracks, in furtherance of the measures which it is the wish of Government should be carried out for the welfare of the British soldier.

25. From a return furnished by the Quarter-master General of the army, showing the number of soldiers, their families, and followers, and an approximate return prepared by the cantonment magistrate, showing the population of the bazars, it appears that, within the military limits of Poona, there is a population of 34,853 persons.

26. Calculating for what in England would be considered the moderate allowance of 30 gallons for each person, the daily consumption of the inhabitants would be 1,045,590 gallons. To supply a plunge-bath to the artillery and to the general dépôt, two such baths to the two infantry regiments, and one plunge-bath for the officers of each of these regiments, the water being changed daily, about 1,57,000 gallons would be required. For the cattle for drinking alone, without an allowance being made for wastage, 14,752 gallons would be needed, according to information received from the Commissariat Department. Thus at a moderate calculation, with the present estimated population, the daily demand in the Poona cantonment would be 1,217,742 gallons; but as the population has hitherto been increasing, and is likely to increase more rapidly, when the Government offices are brought from Bombay, the prospective demand may be estimated at one and a half millions of gallons a day.

27. Kirkee has 3,675 inhabitants, who, at the same allowance, would require 110,250 gallons, while for a plunge-bath for the men, and one for the officers, 52,348 gallons would have

have to be added. The horses and other animals would require 7,404 gallons: altogether the daily demand would be 1,60,000 gallons. The requirements of Kirkee are, however, at present far less than they will be when the factories which are in progress, or in contemplation, come into operation.

(signed) *A. H. Leith*,
Deputy Inspector General of Hospitals,
President Sanitary Commission.

Poona, 5 September 1865.

APPENDIX III.

ANALYSIS of KOKUM (*Garcinia Purpurea*).

REPORT by *Robert Haines*, Esq., M.B., Chemical Analyser to Government.

"EXAMINATION has shown that the chief cause of the acidity of the fruit is malic acid. There is also some tartaric acid, but the quantity appears to be very small. Air-dried *kokum* contains free acid and acid salts, which, reckoned as anhydrous acid, are equal to 15·12 per cent., and the ash contained alkalis and alkaline earths equivalent to 2·14 per cent. more, which existed in the fruit combined with a full proportion of base. The fruit therefore in this state contains a total of vegetable acid, chiefly malic, combined and uncombined, of 17·26 per cent. I am now engaged in preparing a quantity of acid from the small proportion of other soluble matters present, the *kokum* is a most convenient and abundant source of this acid.

"*Kokum*, as bought in the bazar, is fraudulently moistened with water to such an extent as to double its weight, so that allowance must be made for this circumstance in estimating the acidity of the fruit as used by the purchaser."

APPENDIX IV.

GENERAL ORDERS of Government and of the Commander in Chief relating to the Sanitary Condition or Comfort of the TROOPS.

Published during 1865.

Meat-safes and salt-cellars allowed for hospitals of British infantry. G. G. O. No. 142 of 13th January 1865.

Diets for European Hospitals revised. G. G. O. No. 132 of 6th March 1865, and No. 366 of 4th July 1865.

Barrack Department Conservancy Rules revised. G. O. C. No. 278 of 16th March 1865.

Subsistence Allowance and Full Rations for 12 months instead of six to Widows after their Husbands' demise. G. G. O. No. 224 of 12th April 1865.

Wooden Bins allowed for Barrack and Hospital Cook-houses. G. G. O. No. 228 of 15th April 1865.

Prizes granted to 1st and 2nd Class Regimental Workmen. G. G. O. No. 286 of 17th May 1865.

Water and Conservancy Establishment for the Head Quarters of Brigades of Royal Artillery revised. G. G. O. No. 290 of 19th May 1865.

Filters allowed for Guard-rooms. G. G. O. No. 294 of 23rd May 1865.

Scale of clothing and necessaries for transports from India to England revised. G. G. O. No. 327 of 14th June 1865.

Canteen rules revised. G. G. O. No. 350 of 28th June 1865.

Disposal of clothing and bedding used by cholera sick. G. G. O. No. 351 of 28th June 1865.

Marching of troops between Malwa and the Dukhun *via* Aseerghur prohibited between 1st of September and 1st of November. G. G. O. No. 411 of 27th July 1865.

Valises and boxes issued gratis to soldiers' families embarking for England. G. G. O. No. 473 of 13th September 1865.

Malt liquor from the canteen allowed to subaltern officers with European troops. G. G. O. No. 512 of 28th September 1865.

APPENDIX V.

RECREATION ROOMS FOR BRITISH SOLDIERS IN INDIA.

Sanctioned by Despatch, No. 67 of 1865, of Her Majesty's Secretary of State for India.

(Bombay Government Resolution, Military Department, No. 1443 of 1865.)

I. A double fives-court for each wing on an improved plan, one court in each wing to have a back wall to admit of its being used for racket playing.

II. A double skittle-alley in each wing, one of each to be of sufficient length to allow of the American bowl game being played.

III. A gymnasium, according to the English standard plan as far as practicable.

IV. A swimming bath for each wing for men, raised above the level of the ground to admit of complete natural drainage.

V. The same for each wing for the men's families.

VI. Accommodation for workshops, as agreed to by the Rawul Pindee Committee, dated 14th March 1864.

VII. A reading-room with presses for books, a recreation-room, and a regimental refreshment shop, all under the same roof, but the latter at one end, separated entirely from the rest of the building by a partition wall and having a separate entrance.

VIII. A station theatre.

IX. A cricket-ground, to be railed in and turfed by Government.

X. A serjeants' mess with reading and recreation-rooms in a central position, convenient to the staff serjeants' quarters, or in the case of batteries of artillery, or other small bodies of men, under the same roof as the staff serjeants' quarters.

XI. A musketry instruction-room.

XII. A women's day-room for each wing.

APPENDIX VI.

LIST of Works of Construction, Additions, and Alterations, completed or in Progress during 1865, in BARRACKS and HOSPITALS, in connection with the Accommodation, Health, or Comfort of the TROOPS.

KIRKEE.										
Constructing nine lower-storied barracks	-	-	-	-	-	-	-	-	-	Completed.
Improving the floors of seven artillery barracks	-	-	-	-	-	-	-	-	-	In progress.
Alterations to the plunge-bath	-	-	-	-	-	-	-	-	-	Completed.
Constructing matron's and assistant matron's quarters, with cook-rooms at artillery hospital	-	-	-	-	-	-	-	-	-	In progress.
Alterations and additions to the library in artillery lines	-	-	-	-	-	-	-	-	-	In progress.
Erecting filters for the artillery	-	-	-	-	-	-	-	-	-	Completed.
POONA.										
Constructing a range of family quarters for the European sappers and miners	-	-	-	-	-	-	-	-	-	Completed.
Constructing subsidiary buildings for the European sappers and miners	-	-	-	-	-	-	-	-	-	In progress.
Paving a barrack latrine in the sappers' lines	-	-	-	-	-	-	-	-	-	Completed.
Erecting thatched sheds against the rear walls of the regimental latrines at Poona and Kirkee	-	-	-	-	-	-	-	-	-	Completed.
Increasing the size of the washhouses of the flank barracks occupied by the General Dépôt	-	-	-	-	-	-	-	-	-	Completed.
Constructing a raised footpath from the hospital to the female hospital of General Dépôt	-	-	-	-	-	-	-	-	-	Completed.
Temporary urinaries for the General Dépôt	-	-	-	-	-	-	-	-	-	Completed.
Temporary accommodation to prevent overcrowding	-	-	-	-	-	-	-	-	-	In progress.
Marking on the door the maximum number of men to be accommodated in each barrack at Poona and Kirkee	-	-	-	-	-	-	-	-	-	Completed.
Building huts for a Native infantry regiment and 12 quarters for Native officers	-	-	-	-	-	-	-	-	-	Completed.
Erecting a temporary latrine for Native infantry hospital	-	-	-	-	-	-	-	-	-	Completed.
Constructing a temporary latrine for a Native infantry regiment	-	-	-	-	-	-	-	-	-	Completed.
Converting a bath-room into a special ward in one of the Native infantry hospitals	-	-	-	-	-	-	-	-	-	Completed.
Stone pavement to the temporary Native hospital privy	-	-	-	-	-	-	-	-	-	In progress.

MHOW—continued.

Cavalry Lines.

Constructing two urinaries at the barracks - - - - -	Completed.
Putting a plank partition for the serjeants in the barracks - - - - -	Completed.
Constructing temporary latrines for the family quarters - - - - -	Completed.
Converting a part of stable into workshops - - - - -	Completed.
Constructing stone steps for the barracks and outbuildings - - - - -	Completed.
Constructing staircases in the rear verandahs of barracks - - - - -	In progress.
Constructing small cisterns in the bath-rooms of the hospital - - - - -	In progress.
Constructing out-offices for the serjeants' quarters - - - - -	In progress.
Removing masonry partitions at each end of the tiled male hospital - - - - -	In progress.
Making new floors in the wash-house of the hospital - - - - -	In progress.

European Infantry Lines.

Hospital - - - - -	In progress.
Constructing a temporary guard-room for the hospital - - - - -	Completed.
Hand-rails and alterations to the staircases of three barracks - - - - -	Completed.
Constructing staircases in the verandah - - - - -	In progress.
Constructing out-offices for the serjeants' quarters - - - - -	In progress.
Enlarging ventilating openings in the walls of hospital, and fixing temporary doors in the same - - - - -	In progress.

Cantonment.

Improving the European cavalry, artillery, and infantry cells by roof ventilators, iron-barred doors in addition to the wooden ones for ventilation. Some cells enlarged - - - - -	In progress.
Altering the doors of five garrison cells - - - - -	Completed.
Converting two windows into half-glazed doors in the quarters occupied by a staff serjeant - - - - -	Completed.
Converting an old barrack into quarters for the warrant and non-commissioned staff - - - - -	In progress.
Windows in the room occupied by fort guard opened out, and ventilating tubes fitted in the roof - - - - -	Completed.
Erecting a latrine for the Native infantry hospital - - - - -	In progress.

NEEMUCH.

Artillery Lines.

Constructing a privy and covered passage to the hospital - - - - -	In progress.
Supplying doors and windows to the quarters occupied by the serjeant major and quartermaster serjeant - - - - -	Completed.
Placing windows, &c., in the harness-room - - - - -	Completed.

European Infantry Lines.

Constructing cesspool for the drains in rear of the family quarters - - - - -	Completed.
Enclosing as a room the end verandah of barrack used as canteen - - - - -	Completed.
Constructing a cook-house at the solitary cells - - - - -	Completed.
Constructing quarters for 2nd class hospital servants for the Native general hospital - - - - -	In progress.

NUSHERABAD.

Artillery Lines.

Constructing two privies and a cart-house for the barracks - - - - -	Completed.
Constructing a guard-room for the hospital - - - - -	Completed.
Erecting two urinaries in the lines - - - - -	Completed.
Making a surgery in one of the verandah corners, &c., in the hospital - - - - -	Completed.

European Infantry Lines.

Constructing 16 quarter-company barracks - - - - -	Completed.
Constructing out-houses to staff serjeants' quarters - - - - -	Completed.
Erecting a temporary latrine for the school-room - - - - -	Completed.
Erecting a semi-temporary shed for the protection of the ambulance sick cart - - - - -	Completed.
Constructing bath-rooms in four staff serjeants' quarters - - - - -	Completed.
Hanging punkahs in the old barracks - - - - -	Completed.
Furnishing fixed venetians to the ventilating caps of 12 new quarter-company barracks - - - - -	Completed.
Making certain alterations to a building, No. 26, to adapt it as a coach-house for hospital carts - - - - -	Completed.
Supplying large iron-barred windows in six of the garrison cells - - - - -	Completed.
Converting 12 garrison cells into eight large ones, and putting a tiled roof over the terraced one - - - - -	In progress.
Supplying hooks and punkahs in the staff serjeants' quarters - - - - -	Completed.
Enlarging ventilators in the roofs of quarter-guard, hospital, and school-room - - - - -	Completed.

ABOO.

Barracks - - - - -	In progress.
Supplying iron reservoirs for waste water for the bath-rooms of the new barracks -	Completed.
Erecting temporary huts to accommodate the hospital servants - - - -	Completed.

DEESA.

Artillery Lines.

Stables - - - - -	Completed.
Harness-rooms and workshop - - - - -	In progress.
Two latrines - - - - -	Completed.
Building partition walls to separate the apothecary's quarters from the female ward	Completed.
Ventilating the guard-room - - - - -	Completed.
Making small reservoirs and drains to catch the water from the tatties in the verandahs in the married men's quarters - - - -	Completed.
Adding a verandah to the solitary cells - - - - -	Completed.
Adding a room for a library to the serjeants' mess - - - - -	Completed.
Converting the windows with outer wall of the hospital into doors - - - -	In progress.
Paving with stone the floors of the barracks - - - - -	In progress.

European Infantry Lines.

Quarters for the provost serjeant - - - - -	In progress.
Temporary urinaries - - - - -	Completed.
Erecting permanent quarters for 20 married families - - - - -	In progress.
Erecting a temporary barrack - - - - -	In progress.
Dividing the new lavatory attached to the hospital - - - - -	Completed.
Ventilating the hospital guard-room - - - - -	Completed.
Providing ground ventilation for the barracks - - - - -	Completed.
Constructing an ablution-room for the solitary cells - - - - -	Completed.
Increasing the accommodation in the canteen - - - - -	Completed.
Adding verandahs in the front of the cook-houses - - - - -	Completed.
Additions and alterations to the lavatories attached to the barracks - - - -	Completed.
Alterations and improvements in the family quarters infantry and Royal Artillery -	In progress.
Converting the gymnasium of the European regiment into quarters for families -	In progress.
Building partition walls to the pendals attached to the hospitals occupied by the European and Native troops - - - - -	Completed.
Thoroughly ventilating the Native infantry hospital - - - - -	Completed.

AHMEDABAD.

Artillery.

Constructing a privy and urinary for the quarter-guard - - - - -	In progress.
Four bath-rooms added to old temporary wash-house - - - - -	Completed.
Adding verandah on the north and east sides of the quarter-guard, and putting in two windows in the prisoners' cells - - - -	Completed.
Erecting a temporary latrine near the building recently converted into quarters for the brigade serjeant major - - - - -	Completed.
Three temporary stables for the accommodation of 57 horses - - - - -	In progress.
Adding a back verandah to each of the family quarters lately built - - - -	In progress.
Paving three European barracks with stone - - - - -	In progress.
Dividing a ward in the Store Lascar hospital into two - - - - -	Completed.

Cantonment.

Converting the old Golundaz gun-shed into a staff hospital for Natives - - - -	Completed.
Adding a verandah to the Sudur Bazar guard-house - - - - -	Completed.
Conversion of a shed into rooms for hospital servants - - - - -	Completed.
Certain addition to the latrine belonging to the guard-room in the arsenal - - -	Completed.

BARODA.

Constructing new permanent privy - - - - -	Completed.
Quarter-guard of artillery, roof raised and ventilators added, detention roof 18' x 9' added, as also verandah 8' wide along front of the building. Pegs provided for hanging coats on and shelves for bedding, &c. - - - -	Completed.

KURACHEE.

Artillery.

A partition wall in the middle of lower barrack No. 2 - - - - -	Completed.
A new window; perforated iron plates put into four windows in the guard-room and the old gun-shed - - - - -	Completed.
Two barred doors for ventilation in the quarter-guard - - - - -	Completed.
Quarters for an assistant apothecary with two apprentices attached to the hospitals	Nearly completed.
Quarters for four staff serjeants - - - - -	Nearly completed.
Skittle-alley - - - - -	In progress.

KURACHEE—continued.

Infantry, &c.

steps to the plunge-bath situated near the soldiers' bazar	-	-	-	-	-	-	Completed.
steps to the plunge-bath in the Somerset lines	-	-	-	-	-	-	Completed.
By an archway both rooms of the school-house made into one, Somerset lines	-	-	-	-	-	-	Completed.
Steps to the Napier barracks plunge-bath	-	-	-	-	-	-	Completed.
Removal of the iron building in rear of the Napier lines	-	-	-	-	-	-	In progress.
Alterations and additions to the latrines, &c., in the FitzClarence lines	-	-	-	-	-	-	Completed.

GHIZREE.

Weather frames to the coffee-shop at the sanitarium	-	-	-	-	-	-	Completed.
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HYDRABAD.

New bath-room and privy to the garrison cells	-	-	-	-	-	-	Completed.
Steps to the plunge-bath of the European infantry regiment	-	-	-	-	-	-	Completed.
Adding a door and window to the ordnance staff serjeants' quarters in the fort	-	-	-	-	-	-	Completed.
A guard-room in the fort	-	-	-	-	-	-	Nearly completed.

JACOBADAD.

Constructing lines at the frontier outposts	-	-	-	-	-	-	In progress.
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Irregular Cavalry.

Constructing lines at the outpost at Kushmore	-	-	-	-	-	-	In progress.
Constructing lines at the outpost at Soree	-	-	-	-	-	-	In progress.
Constructing lines at the outpost at Joj	-	-	-	-	-	-	Nearly completed.
Constructing lines at the outpost at Sunree	-	-	-	-	-	-	In progress.
Constructing lines at the outpost at Goranaree	-	-	-	-	-	-	In progress.

BOMBAY.

Colaba.

Providing Vehar water to the infantry and sanitarium barracks and officers' bungalows	-	-	-	-	-	-	In progress.
Inserting a door in the bath-room of the sanitarium hospital	-	-	-	-	-	-	Completed.
Improving family quarters' drains	-	-	-	-	-	-	Completed.
Improving the privy seats of infantry hospital	-	-	-	-	-	-	Completed.
Erecting six temporary bath-rooms	-	-	-	-	-	-	In progress.
Erecting a partition wall in one of the barrack-rooms to provide accommodation for a serjeants' mess	-	-	-	-	-	-	Completed.

BELGAUM.

Artillery.

Stables with subsidiary buildings	-	-	-	-	-	-	Completed.
Altering the plunge-baths in the fort	-	-	-	-	-	-	Completed.
Constructing masonry platforms for the lavatories of the old and new barracks in the fort	-	-	-	-	-	-	Completed.
Additional subsidiary buildings	-	-	-	-	-	-	In progress.

European Infantry.

Altering the plunge-baths	-	-	-	-	-	-	Completed.
Constructing a covered passage to the bath-rooms	-	-	-	-	-	-	Completed.
Constructing two lavatories in the verandahs of the hospital	-	-	-	-	-	-	Completed.
Constructing a lavatory and bath-room for the upper-storied ward of the hospital	-	-	-	-	-	-	Completed.
Constructing two temporary tiled sheds for dry earth in rear of the barrack latrines	-	-	-	-	-	-	Completed.
Constructing two staff serjeants' quarters	-	-	-	-	-	-	In progress.
Adding bath-rooms to all wash-houses of barracks	-	-	-	-	-	-	In progress.
Constructing screen walls to the privies of the married men's quarters	-	-	-	-	-	-	In progress.

ADEN.

European Infantry and Artillery.

Four upper-storied barracks, Front Bay	-	-	-	-	-	-	In progress.
Subsidiary buildings to the Isthmus barracks	-	-	-	-	-	-	Completed.
Paving lower rooms, Isthmus barracks	-	-	-	-	-	-	Completed.
Family quarters and out-houses, Isthmus	-	-	-	-	-	-	In progress.
Erecting four bath-rooms to the barracks	-	-	-	-	-	-	Completed.
Upper-storied barracks, Steamer Point	-	-	-	-	-	-	In progress.
Additional upper-storied barrack with subsidiary buildings, Steamer Point	-	-	-	-	-	-	In progress.
Ventilating the family quarters European infantry	-	-	-	-	-	-	Completed.

Native Infantry Lines.

Privies and urinaries	-	-	-	-	-	-	Completed.
Additions at Perim	-	-	-	-	-	-	Completed.

INSPECTION REPORTS.

RECOMMENDATIONS for the Improvement of the ARTILLERY LINES and CANTONMENT, SHOLAPOOR.

(Inspected 4th January 1865.)

THE artillery lines are at the south-west end of the cantonment, from the rest of which they are separated by a watercourse or small ravine, that has been embanked to form a reservoir of water. The high road to Beejapoor passes between the artillery barracks and the hospital.

The barracks and subsidiary buildings occupy nearly the highest part of a gentle eminence, and are about 625 yards from the reservoir, and at an elevation of about 48 feet above its surface. The buildings stand on a porous soil or gravel (or moroom), formed from the decaying subjacent trap rock, but the parade ground, which is on the south and south-west of the barracks, is on black soil retentive of moisture, adhesive after rain, and fissured in the dry season.

There is no appearance of anything having been done artificially for the drainage of the lines. The natural fall of the surface is favourable, and the water falling on all to the westward of Beejapoor road flows to the north and west. The fall of the ground east of the road and on which are the hospital and grass cutters' lines, is towards the reservoir above mentioned, and which is the chief source from which the inhabitants of the cantonment are supplied with water.

The ground in the neighbourhood of the ravine, below the embankment, is swampy from leakage. Trenches have been cut to drain it, but these are at present choked, and are full of stagnant water. Eastward of this swamp there is the Moteebagh, where the soldiers have their gardens. There is an over-abundant supply of water for irrigation, and this is taken advantage of to grow lucerne, which is more remunerative than most other articles. It would be conducive to health were the superabundance of water drained off.

It is proposed to build new barracks for the artillery, and a site has been chosen for the buildings about 250 yards south-west of the present site, and with about 10 feet greater elevation, it being the highest ground in the artillery limits. This part is barely clear of the black soil.

The three barracks are placed in line, at intervals equalling the length of a building, and with aspect south by west and north by east; they are ground-floor lime-masonry buildings, with earthen floors and thatched roofs, and have a six feet wide-tiled open verandah on the south and west only. The height of plinth varies with the slope of the ground, but its minimum is about two feet. The floor of the verandah is a foot lower.

Each building has a room for single men $96\frac{1}{2}$ feet long and 24 feet wide, or which has an area of 2,316 square feet, and is 10 feet high under the beam, or $11\frac{1}{2}$ feet if the height of the wall plate be taken, and then it contains 26,634 cubic feet of air. At one end there are two serjeants' rooms, each $11\frac{1}{4}$ feet square, with two windows, and with its only door opening into the men's room. At the other end of the barrack-room there are two windows, and on each side there are two doors 7 ft. $\times$ 4 ft. clear of the frame, and seven windows 5 $\times$ 3 ft. and closed with wooden shutters only. There are three ridge ventilators 2 feet square, with louvre boards, but nearly blocked up with pitch.

The 2,316 feet of area would afford 90 square feet of floor to 25 men, or 80 feet to 28 men; but as there are on each side but eight intervals between doors and windows, and one corner besides in which a cot can be placed, and as the intervals are but $6\frac{1}{2}$ feet wide from splay to splay, even the smaller number of men cannot be placed in one of these rooms so as to be clear of window and doorway draughts, and at the same time to be 3 feet apart, as recommended by the Royal Commission.

These barracks were built for a troop of horse artillery, but have lately been occupied by the men of a field battery, which, with an establishment of 134 trumpeters, rank and file, would, after deducting 12 per cent. for married, leave 118 single men to be accommodated; these, on an aggregate area of $(2,316 \times 3 =)$ 6,948 square feet, would each have but 58 square feet, or 32 less than the mean, and 22 feet less than the minimum recommended by the Royal Commission. The aggregate cubic contents of the three barrack-rooms, if measured to the wall-plate, are 79,902 feet, or only 677 feet to each man. Each pier between the windows is provided with two saddle or harness racks; there is no separate harness-room. At the inspection the barracks were unoccupied, as a relief of batteries was going on.

The ablution accommodation is $14\frac{1}{4}$ feet of the east end of the south verandah, paved, and provided with a masonry bench, and partially enclosed with a 5 feet high wall; the room is $4\frac{3}{4}$ feet wide. There is a plunge-bath at the Moteebagh, near the soldiers' gardens, and about five furlongs from the barracks. This bath is dangerously deep for those who cannot swim, being $7\frac{1}{4}$ feet at the deeper and $5\frac{1}{4}$ feet at the other end, but it is now being made shallower. It is not provided with an urinary.

The

The barrack urinaries, which were formerly in verandahs, have been removed, and temporary sheds with partial bamboo walls, detached from the barracks, are used.

There are two latrines, one at the west flank, the other in rear, or the eastern barrack. They have each two rows of seats built back to back, with an intervening passage for the sweeper. Under and behind the seats there is a pavement sloped to a central cesspit for the reception of the fluid excreta: metal pans have not yet been introduced. The seats are not partitioned.

The cook-room is a paved and tiled building, with the usual masonry fire range, and an oven so large as but rarely to be used, on account of the large quantity of fuel it requires.

The coffee-room is in the same building with the canteen. The library and school-room were under one roof and in one room; this being found inconvenient, the serjeants' mess-room was used lately as a school-room. There are a fives-court and a covered skittle-alley and a cricket-ground.

The quarter-guard is a thatched building, having its uneven earthen floor on a level with the outer ground; it has a false verandah on the south and west. It is in length about 30 feet, and in breadth 15 feet; there is a door on the south, a window 4×3 feet with only a plank shutter on the north, and a similar window on the west.

At the east end of this guard-room, and under the same roof, is the detention-room. This is about 18×15 feet; its door is barred and opens into the guard-room, and in each of its other three sides it has, high in the wall, a large barred window always open, but protected from rain by a weather board. There is a portion of the roof raised for the ventilation of the building.

There are three prison cells in one block in the hospital compound; they are sufficiently roomy, but their floors are scarcely higher than the surrounding ground, and one part of the wall bulges and is unsafe.

The staff serjeants' quarters are old, ill-ventilated houses in rear of the barracks.

The family quarters consist partly of old thatched hovels, and in part of a block of five quarters built about a year ago. These last face the east, and have behind them, on the west, or windward, their privies and cook-rooms. The block is on a plinth, varying with the slope of the ground, and with its least elevation only six inches. The walls are of brick and lime, the floor is earthen, and the roof has a double layer of tiles. On the east or front and the two ends, there is a verandah $7\frac{1}{2}$ feet wide, enclosed with a dwarf wall $2\frac{1}{2}$ feet high, and roofed with a single layer of tiles. Each family has two rooms placed back to back, the front one 16×12 ft. $\times$ 13 ft. high, with a door opening on the verandah, the latter 6 ft. 9 in. $\times$ 3 ft. 4 in., and a glazed window $3\frac{1}{2}$ ft. $\times$ $2\frac{1}{2}$ ft. clear of the frame; the back or western room 16×10 ft. with the wall on one side 12 ft., and on the other only 6 ft. high; in the six-foot wall there is a door $5\frac{3}{4}$ ft. $\times$ 2 ft. 4 in. and a glazed window $2\frac{1}{2}$ ft. square. The door of communication between the two rooms is 5 ft. 9 in. $\times$ 2 ft. 4 in. When these rooms were first occupied they were found intolerably hot, there being no ventilation when the doors and windows were shut, and the roof over the back room being very low. Two ventilating openings were subsequently made in the front wall over the doorway and window; each 2 ft. $\times$ $1\frac{1}{2}$ ft., and two others, high in the partition wall, of $1\frac{1}{2}$ ft. square. Still the ventilation is imperfect, there being no opening on the western side to allow of perfilation.

There are two cook-rooms for the families, and an ablution room, and a privy opposite each end of the block, one appropriated to the males, the other to the females. The privies have under the seats finely cut stone pavement sloping to a large cesspit. The two end quarters have a door opening into the end verandahs, and an adjoining paved water or ablution room.

The hospital is on the east flank of the barracks, with a westerly aspect; it has a front yard bounded by a wall and railing, a small guard-room, now used for sick Native followers, and the quarters of the assistant apothecary, which have their cook-house injudiciously placed very near, and to the windward of the hospital, being close to its north-west angle.

The hospital plinth varies in height with the fall of the surface, and on the west is only nine inches. The walls are of lime masonry, the floor is paved with stone, and the roof is tiled. There is a verandah from 9 or 12 feet wide, paved, and on the front and ends inclosed with a dwarf wall and hinged weather-boards. There are two adjoining wards separated by a wall reaching to the tie-beam, and in which there is a door of communication; each ward is $30\frac{1}{2} \times 23\frac{1}{2}$ feet with $14\frac{1}{2}$ feet under the beam, or $16\frac{1}{2}$ feet height to the wall-plate, and has on the front or west a door 8×4 feet between two windows $6\frac{1}{2} \times 3$ feet, at the end two such windows, and on the east a large, or as it were a double window 6 ft. 8 in. $\times$ 6 ft. 2 in., and a door opening into a room formed by inclosing the middle portion of the back verandah. The verandah-room was formerly the dispensary, but has lately been used as a dining and day-room for the sick; all the casements are glazed. The disposition of the windows is unfavourable to the satisfactory arrangement of the cots. Over each ward there is a ridge ventilator two feet square, closed in and pitched, and in the centre a cowl ventilator of one foot sectional diameter, still open.

Besides the day-room, other two portions of the east verandah are inclosed at its corners to form an apprentices' room and a bath-room. This latter has a large masonry bath, which can be of no use, from the impracticability of supplying a sufficiency of water to fill it. There is a backyard enclosed on the sides by covered passages prolonged from the end

verandahs and walled outwardly, but provided with barred openings for ventilation. The passage on the north leads to what formerly was an urinary, and to the latrine which has plank seats without partitions, and under them a pavement from which liquid excreta were intended to flow to a cesspit. The south passage leads to a small room formerly used for patients with contagious disease, but now as the dispensary. The east side of the court is occupied with the cook-room, which is paved, and store-rooms. A gate at this side leads to the dead-house, which is outside.

A new tiled building on a higher plinth stands south of the hospital; it was intended for female sick, but having no subsidiary offices, it cannot be used by them. It has one well-lighted ward $29\frac{1}{2} \times 21\frac{1}{2}$ ft. and $16\frac{3}{4}$ ft. high. It also has a cowl ventilator in the roof. This room has been given for occupation to the hospital serjeant.

The horse lines are about 70 yards south of the barracks, and the native horsekeepers' huts are on the west of those lines.

The officers' houses are north of the barracks on a lower part of the ground, that is here also rocky and gravelly: they are very old, thatched, poor habitations.

The barracks and hospital are supplied with water drawn from a well below the reservoir, and carried in skins and distributed by hand. The water has been examined chemically and found to be of good quality. The officer commanding the station suggested that the reservoir should be cleared of its accumulated silt.

RECOMMENDATIONS.

If the present intention to erect new barracks be speedily carried into effect, it will not be expedient to incur much expense in improving the present ones. Were these, however, to continue to be the habitations of the soldiers, they ought to be improved by having—

1. The walls raised to 18 feet.
2. The roof tiled and provided with ridge ventilation.
3. An inclosed verandah on north side for a day-room.
4. Clerestory ventilators between the eaves and verandah roof.
5. Glazed casements.
6. Paved floors.
7. Separate harness-room.
8. Detached ablution room fitted with basins, with supply, waste, and discharge pipes, and screened shower-baths, with pipe-drain to carry off the waste water beyond the camp limits northward.
9. Water raised by a force-pump and syphon from the wells below the reservoir, and to be distributed by pipe to the barracks.
10. The latrines provided with metal vessels fitting close up to the seats, and the seats partitioned.
11. The floor of the quarter-guard room raised and paved, its ventilation improved, as has been done in its adjoining detention room.
12. New prison cells away from the hospital.
13. Improved ventilation in the staff serjeants' quarters.

There are improvements that are called for which are unconnected with the question of new barracks; they are the following:—

14. The newly built family quarters should be further improved by having ventilating openings under the eaves of the roof on the west side, or by dormer windows in the roof of the back room.

15. The remaining old huts should be replaced with new quarters on a revised plan, and with a westerly aspect, and with their offices to their leeward.

16. The privies should be improved in the way recommended for the barrack latrines, and the cesspits should be removed.

17. The ventilation of the hospital should be improved by clerestory ventilators with revolving shutters.

18. The assistant apothecary's cook-room should be removed from the hospital inclosure.

19. The latrine should have partitioned seats and glazed vessels fitting close up to them, and the cesspits should be removed.

20. The masonry bath should be removed from the ablution room, and this should be fitted with fixed washing basins supplied by tap with water.

21. Where

21. Where the urinary was formerly, a bath-room should be made, and it should be provided with a screened shower bath and a screened tub bath.

22. The cook-room should be provided with a fixed boiler, with tap for the constant supply of hot water.

23. A small isolation ward should be provided.

24. The female hospital should be completed with an ablution room and a privy.

25. In order to keep clean the gathering ground of the water to be stored in the reservoir that supplies the cantonment, the grasscutters' and the cow and buffalo keepers' huts should at once be removed from their present position on the east flank to the north-west of the family quarters, or elsewhere.

The ground on which the habitations of men and animals are placed cannot under any circumstances be kept pure, and that on and near which these people live must of necessity be very foul, as they have no privies, and have habitually to resort to the fields to answer the calls of nature. Here those fields are the surface over which the rain-fall flows to the reservoir.

26. The accumulated silt in the reservoir should be removed this year when it is empty of water.

27. The trenches in the swamp below the reservoir should always be kept clear and with proper slope to carry off the water. The immediate clearing of the choked drains was ordered by the officer commanding the station on his attention being directed to their present condition.

28. An urinary should be provided for the plunge bath.

29. In designing the new barracks the supply of water to them by pipe should be included in the plan. Also the pipe drainage for the ablution rooms.

30. Should it be found that the revised plan of new barracks will require more ground than was calculated for in choosing the new site, the extension of this should be towards the present barracks, and not southward or south-westward, where the black soil is found.

After having made a general inspection of the cantonment of Sholapoor, it is thought necessary to bring to notice a few things in which improvement is particularly called for.

The Native infantry lines are most objectionably continuous with the Suddur Bazaar.

31. To remedy this, it appears advisable to remove the Regimental Bazaar, which fills up what would otherwise be an interval between the men's huts and the Suddur Bazaar, and as the buildings of the Suddur Bazaar in the vicinity of the road become ruinous, to prevent building and resume the land. The Regimental Bazaar might be located on the east flank of the men's lines.

The strength of the Native cavalry at the station has been reduced from a regiment to a squadron, and the abandoned huts have had all the roof and other wood carried off from them, and now the ruinous mud walls are not only unseemly, but are a cover for unwholesome filth. There are no latrines for the cavalry, and the very small space of a native soldier's hut affords but scanty convenience for those families who, rather than offend public decency by resorting for the purposes of nature to the neighbouring ground or ruined huts, confine themselves to their own abodes.

32. It is recommended that the ruined huts be cleared away, and,—

33. That latrines be provided for the Native cavalry soldiers and their families.

The state of the Fort ditch will be noticed in connection with the town of Sholapoor, which will be separately reported on.

(signed) *A. H. Leith*,
Deputy Inspector General of Hospitals,
President, Sanitary Commission.

Poona, 16 January 1865.

REPORT on the CANTONMENT of AHMEDNUGGUR.

(Inspected between 19th and 22nd September 1865.)

PRESENT:

A. H. Leith, M.D., President.
Colonel H. W. B. Bell, R.E., Member.
T. B. Beatty, M.D., Member and Secretary.

THE cantonment of Ahmednuggur is 126 miles distant, in direct line, from the open sea, and at an elevation of about 1,900 feet above it. It is 70 miles from Poona, and 33 miles from Seroor, in a N.E. by E. direction; and Maligaum is N. $\frac{1}{2}$ W. from it at a distance of 100 miles.

The mean annual temperature, according to the imperfect observations recorded, is 77° Fahr. The range of temperature is less trustworthy, as no special care seems to have been taken to place the thermometers favourably for obtaining the minima and maxima in the open air. The mean rainfall for 11 years, according to observations made in the neighbouring city, has been 25 $\frac{1}{2}$ inches.

The cantonment occupies four square miles of ground lying close to the east and south sides of the town of Ahmednuggur, from which it is separated by the city wall. The ground falls from the city to a large watercourse, called the Bhingar Nulla, that runs south-westward towards the Seena river, and nearly equally bisects the cantonment. The surface again rises a little towards the site of the European barracks south of the nulla.

The surface soil is mostly the regur or stiff and retentive black earth. The subjacent trap rock, however, or its disintegrating gravel, appears at the surface at the north-east end of the cantonment, and the low ridge on which the European barracks towards the south end are built, is somewhat gravelly. Near the eastern limit there is a gravelly surface in the neighbourhood of pits that are dug to obtain kunkur, or concretionary carbonate of lime.

The natural drainage is generally good, there being a fall from the highest and most western part towards a watercourse west of the city, and from the rest of the north-western half of the cantonment the fall is towards the Bhingar Nulla. The south-eastern part, on which are the lines of the European troops and the Sudur Bazar, is drained partly into the Bhingar Nulla, and partly into a watercourse that runs nearly parallel with it, and farther south. The brigade parade ground is somewhat uneven in surface, and the soil being very retentive, small pools of water were seen remaining on it several days after rain had fallen. Westward of the Sudur Bazar the ground is uneven from excavations made in former times.

Excepting the parade and practice grounds, and the parts occupied by the men's and the horses' lines, and the bazars, the ground is thinly wooded, the most common tree being the Babool or Acacia Arabica.

The brigade consists of a troop of horse artillery, a regiment of European cavalry, and a regiment of Native infantry. The fort, which stands south of the town, and between it and the Bhingar Nulla, is occupied with stores only.

CAVALRY LINES.

Barracks.—They are 12 in number, arranged in two parallel rows, the barracks of the front row covering those of the back row. The distances between the rows and between the neighbouring barracks are about 60 feet.

The aspect is north-west by west. The buildings are of brick and lime mortar, and they are tiled. The plinths vary according to the slope of the ground, from 1 $\frac{1}{2}$ to 3 $\frac{1}{2}$ feet in height. The earthen floors are now being replaced with stone pavement.

Each barrack room is 95' $\times$ 24', and is 21' high to the top of the wall, giving surface accommodation at the regulation allowance of 90 square feet to 25 men, each of whom has 1,915 feet of space. There is an open verandah 12 feet wide in rear, and in front there is a verandah of the same width, partly glazed, partly venetianed, and which is used as a saddlery room. The room has four ridge ventilators of 18 inches diameter, and on each side two doors and nine windows; and there are above these 11 clerestory windows, each 4' $\times$ 3', with revolving shutters, both glazed and venetianed, and which can be closed separately as required, to exclude rain or dust.

Owing to the faulty arrangement of the doors and windows, although there is a superficies of floor sufficient for 25 men, only 22 of those who occupy the rooms can place their cots so as not to be opposite a window or doorway. There is no day-room.

At the right end of each barrack there are two serjeants' rooms enclosed from the verandah, and of dimensions 24' $\times$ 12', and with their outer or lower wall 13 feet high.

They

They have each two doors and two windows, and they are without any arrangement for ventilation independent of these. Between the serjeants' rooms and the men's room there are two dark unventilated apartments that are used to hold stores, and which could not easily be rendered fit for habitation.

At the left end of the barrack, the verandah is enclosed as an ablution room, and it has a masonry bench for basins, but so high that it is never used, the men preferring to place their basins on the half-cask bathing tubs, turned upside down for the purpose. Besides these tubs and basins, the furniture consisted of scuttle butts for water, and wooden floor gratings. The waste water flows to a masonry cesspool. There is no screened bath-room, nor place for private ablution.

Staff Serjeants' Quarters.—There are two detached buildings for serjeants of Class A. The quarters have no ventilation, excepting by the doors and windows, which do not appear to be kept sufficiently open. The farrier major and the band master occupy quarters near the hospital, and which belonged formerly to the Golundaz Battalion.

Serjeants' Mess-room.—In rear of the left end barracks there is a building nearly equal to them in dimensions, the north-east half of which is used as a serjeants' mess-room. It is sufficiently large, and it is as lofty as the men's barrack rooms, and is equally well ventilated.

The other end of the building accommodates the men's library. It was well furnished with periodicals, and the men could play at several in-door games. The number of subscribers was 260. The room has but an earthen uneven floor, and it is too small. Between it and the serjeants' mess there is a room of considerable size, which was being temporarily occupied by a serjeant, and which might be added to the library.

There is no coffee nor refreshment room connected with the library. A building in a line with it, at a few yards distance, which was formerly a punishment shed, and which is now used temporarily as a canteen by the troop of artillery, would, when available, be well fitted for a refreshment room.

Canteen.—The floor is earthen and uneven. The accommodation is said to be insufficient, but were there a covered recreation room, it would, it is thought, be sufficiently large.

Cook Houses.—There are four of these, and they are placed two and two. They are dark and smoky. The fire ranges are too high and the fire places in bad repair. There are ovens that are too large to be used on ordinary occasions. The sinks are on the level of the floor, and the waste water and liquid refuse flowed to large masonry cesspools behind the building. These reservoirs were said to be emptied daily, but it is impossible to keep such receptacles clean.

School Rooms.—The schools are badly accommodated in the range of building which formerly was a gun-shed, and in which the regimental workshops also are at present. The earthen floor is on the level of the outer ground and the walls are low. Estimates, it was said, were being prepared for a new building. There were about 80 adults and 30 children attending the schools.

Gymnasium.—This is in a large building erected by the Bombay Artillery and now the property of the 3rd Dragoon Guards. It is furnished with all the usual appliances of a gymnasium, and is much resorted to by the men. There were 260 subscribers to it.

Theatre.—This is also the property of the regiment. It is under the same roof as the gymnasium.

Fives Court.—There is a double one, but one side is enclosed as a racket court for the officers, and its door was locked at the time of the visit of the commission.

Skittle Alley.—There is one covered alley. It is said to be insufficient. Some soldiers were seen playing at quoits.

Cricket is said to be a favourite amusement of the men.

Workshops.—The regimental workshops occupy a considerable number of men. They are accommodated in the range of buildings which was formerly the artillery gunshed, when a battalion was stationed at Ahmednuggur. The ventilation was deficient, but sanction for its improvement had already been received. There were but two blacksmiths and three carpenters employed in private workshops, and they had accommodation near the hospital in buildings that formerly belonged to the Golundaz Battalion.

Gardens.—There was a considerable extent of garden under cultivation and in good order near the plunge bath. About 21 men worked in these gardens. At the family quarters also there were small gardens, and they were objectionably near to the buildings, the prohibitory rule not being yet in force.

Plunge Bath.—There is one about 50 feet long and seven feet deep at one end. At the other end is a flight of steps, and the bottom, which originally shelved gradually from them towards the deeper end, has recently been relaid at a uniform depth of four feet in the prescribed fourth part of the length, and then there is a sudden fall. The inclined plane was preferable. The bath is supplied from a neighbouring well at which bullocks are worked daily. The overflow of the bath was being used in irrigating the gardens.

The bath is said to be emptied once a fortnight, and to take more than two days to fill again. There are bathing parades, and one troop is marched to the bath each day. Every man thus is obliged to bathe once in eight days, and he may bathe as much oftener as he pleases. There are no fixed seats, and there is an insufficient number of pegs for clothes. There is no urinary at the bath.

Barrack Urinaries.—There is a small building of permanent construction detached at a distance of seven feet from the barrack, and in a line with the front verandah, and which is now the urinary. Although a tub has been substituted for the masonry trough formerly used, this room is, from its position and its want of ventilation, a constant nuisance to those in the barracks.

Barrack Latrines.—There are two latrines in rear of the other subsidiary buildings. Each consists of two rooms, back to back, with a central passage for the sweeper and with a masonry cesspit for fluid excreta, and which was said to be cleaned daily. One was without soil vessels. The other had been recently altered and had soil pans, but they did not fit close up to the plank seat; and the floor, which was of mud instead of being paved, was wet with urine. The compartments were not screened.

Family Quarters.—They consist of four blocks of 20 quarters each, placed in two rows to the right of the single men's barracks, with the same aspect, but in a line farther back. All are faulty in being built with floors on the level of the surrounding ground. Two blocks are built on the standard plan of 1858, like those of the Infantry Gorporee barracks at Poona, and are very good. The other two are similar in plan to the married men's quarters at Kirkee and at the depôt at Poona, without the roof ventilators, and having all the defects that have been mentioned in the report on those at Poona.

The out-offices of the first two blocks are sufficient in number. The other two blocks have for every 10 quarters two cook houses and two privies and ablution rooms. The privies were foul, and they had cesspits, which were still in use, and their floors are unpaved.

Quarter Guard.—The main room is 24' 8" × 18' 9" and 15' 3" high, with two doors and two windows with wooden shutters and unglazed. At each end of the room there are two lock-up rooms opening by barred doors into the verandahs. They are placed back to back and are 15' 3" × 8' 3"; they have earthen floors and have openings at the level of the floor, by which they are ventilated into each other and into the guard room, an arrangement which is objectionable. They have also roof ventilation. The guard amounted to 25 at night and gave seven sentries; there was not sufficient accommodation in the proper guard room for more than five, and it had to occupy, in addition, two end verandah rooms, and a tent which was pitched close by. The front verandah only is paved, and that but partially. There was no place for the relieved sentries to hang wet cloaks on, excepting the doors.

There is a privy and urinary for the guard, but they were in an offensive condition. A cesspit connected with them was in use.

The floor of the more southern cells is below the level of the ground in rear of the guard room.

Hospital Guard Room.—Is sufficient for only three men, being only 20' × 16' × 11' high. The guard at night had a strength of 13 and gave four sentries. A tent had to be used to supply the deficiency in dormitory room. The windows have plank shutters and no glass.

Solitary Cells.—They are far below the present regulation size, having only 10 feet square of floor. There are ground ventilators, and there is in each a small window high in the wall. There is a barred as well as a plank door. The walls were surrounded with grass matting which is kept up throughout the year. It is said to be intended here to protect the walls from the heat of the sun's rays. The floors are mostly of concrete and they were broken. One is earthen. There is neither privy nor ablution room. Each prisoner has an earthen vessel in his cell at night.

The Horse Lines are in front and to the windward of the barracks. New stables are being built. Those lately completed are complained of as being offensive to those on duty when walking in the centre passages between the two rows of horses. The sides are open, the tiled roof lofty and supported on thick brick pillars; the eaves are low, and there is no roof ventilation.

The litter was deposited improperly to the windward of the Suddur Bazaar, between it and the Fort.

The Officers' Bungalows are in large gardens, in rear of the men's barracks, and some of them are on rather lower ground.

Drainage.—The ground among the barracks was clean and even. The lines and parade altogether cover 402 acres. The natural fall from the married men's quarters and the barracks near them is towards the Bhinga Nulla. From the hospital, and the barracks near it, and the officers' lines, the drainage might be conducted to a smaller water course in the rear. Besides a few surface gutters, there is no artificial drainage, not even where
it

it is much required in the rear of the quarter guard and of the family quarters, where there are no plinths.

Occupation of Dormitories.—The established strength in India of a regiment of European cavalry is 515, or sergeants 38, and rank and file 477. Her Majesty's 3rd Dragoon Guards at the time of inspection had 449 in India, of whom there were present at Ahmednuggur, rank and file 378, or 99 less than the complement, while there were only 15 married instead of 45, which would be allowed at the regulated proportion of 12 per cent.

The 12 barracks afford sleeping room for 300 rank and file, single men, or for 120 less than the establishment, were 12 per cent. of the regiment married; but as, of the whole 402 now in India, only 16, or rather less than four per cent., are married, the deficiency may rather be estimated at 158.

There were 63 of the 363 unmarried rank and file present with the regiment who would have had no room in the single men's barracks, even if they had all been available as dormitories for the cavalry alone; but four barracks were in possession of the artillery, and one was in the hands of workmen, being paved, so that seven only were occupied by the cavalry. Since the publication of the order of Government to allow 90 superficial feet to each man, the number of occupants of the barrack rooms had been restricted to 25 each. The excess was accommodated partly in the vacant family quarters, to the extent of 121 men, partly in the band room and at the workshops, school-room, library, and several other buildings which were thought to require the presence of a soldier at night for security. Of the rank and file 37 were on guard, 25 were in hospital, and one was in the provost cell.

Hospital.—The hospital premises are at the left flank of the barracks, and are enclosed in front with a dwarf wall and railing, within which there are the guard room, the hospital serjeant's quarters, and the quarters and store room of the hospital steward.

The main building consists of two wards with the same N.W. by W. aspect as that of the barracks. There is another ward that stands out from the right end of the other two, towards the front and at right angles to them. In rear of the main building there is an enclosed court 140' × 78' with a covered passage on each side leading to the ablution rooms and latrines, while the cook-room, the apothecary's store, and the medical apprentices' room complete the quadrangle.

The building has its floor but little raised above the surrounding ground; it is of brick and lime mortar, with cut stone paved floors and a tiled roof. There are verandahs on all sides from 9 to 12 feet wide. There is accommodation for only 38, at the allowance of 130 square feet each; the number for which there should be accommodation is 61.

The wards of the main building are each 65' × 24', giving a superficies sufficient, at the proposed rate of 130 square feet, for 12 cots. These wards are separated by a passage six feet wide, between two walls which do not reach the roof. The side walls are 21 feet high. In front there are seven windows, and on the rear side of the ward there are only two windows and a door, much dead wall being left. There are two additional windows at the end of the left hand ward. Each has on a side seven clerestory windows, about three or three and a-half feet square, furnished with revolving shutters, both glazed and venetianed. The rooms have cloth ceilings. The front verandah is open, excepting a dwarf wall. The rear verandah is partially enclosed to form a very indifferent surgery and a dispensary, and two rooms in which the drinking water filters are kept. The left end verandah is walled up and ventilation is thereby impeded. The north ward is 70' × 24', or sufficient in area for 14 cots. Its height is 21 feet, and it is ceiled with cloth, and has such clerestory ventilators as the other wards have. Like them it has the verandah on one side open, and has on that side seven windows. On the other side the verandah is completely enclosed to form three rooms of various sizes. The largest of these three has been occupied by sick prisoners; but it, as well as the other two rooms, may be said to be devoid of ventilation, as each has but one door, which opens into the adjoining ward, and the windows in the outer low walls are small, and there are but one in each of the small rooms and two in the larger. The cook-room and the privy of the assistant apothecary are within 12½ feet of these verandah rooms.

There are two lavatories, which have tables for basins and a slipper bath, and in the south-eastern lavatory there is the appearance of two shower baths, which however are not screened, and which have not been in use for a long while. There is also the apparatus for supplying warm water to this lavatory, but it is not in use. The ablution rooms are drained to large masonry cesspits. The cook-room was dark and smoky. The floor is badly paved, and has wide crevices between the paving stones. The sink for fluid refuse is discharged into the ablution room cesspit.

Apprentices' Room is a stone and mud structure, built on the rear wall of the back court of the hospital. It is obstructive to ventilation. Its privy was in an offensive state.

Latrines and Urinaries.—There are two at the rear corners of the back courtyard. The latrines have 10 plank seats, but they are not enclosed separately for privacy, neither are they provided with soil pans, fitting so as to prevent the pavement below from being soiled. The urinaries are under the same roof and are furnished with tubs, and the washings of the floor flow to the ablution room cesspit. The latrines have no roof

ventilation, and the offensive smell from the south one is sometimes perceived in the hospital wards.

Dead House.—It is outside the rear enclosure wall. It has no such convenience for the sweeper as is requisite in pathological examinations.

Isolation Ward.—It is in line with the main building, and to the south-west of it. It has a single room with an open verandah. The floor is very uneven, being made of bad bricks badly laid. The building is in close proximity to a bungalow occupied by the band master, and it is near the single wards for delirious or insane patients.

Single Rooms for Delirious Sick.—There are two such wards built together, detached from and at the south-west side of the hospital. They are on high plinths. They are furnished with fixed cots, and one has its walls padded. They are quite dark when the doors are closed.

Female Hospital.—It is a ground floor building at the left rear of the male hospital. The plinth is about two feet high. The walls are of brick and lime mortar, and the roof is tiled. There are two wards placed end to end; each is 13' 3" × 14' and 18' high; their aspect is to the S.W. by S., on which side there is an open verandah. At the left end the roof has been prolonged, and the verandah, which is widened, affords very indifferent quarters to the matron and her husband. The assistant matron and her husband occupied one of the two wards, while one-half of the rear verandah was being widened and its roof prolonged that it might be converted into quarters for them; in doing this, the only window on that side of the ward had been built up. The rest of the rear verandah is turned into a bathing room. The claims of the sick, as regards accommodation, quiet, privacy, and ventilation, had not been dealt with as of paramount importance. A cook room for the matrons was about to be built to the windward of the hospital and close to it. Very near this hospital, and within the hospital enclosure, there is a house that was allowed to be built by a medical warrant officer doing duty in the military hospital, and which he sold to a native inhabitant of Ahmednuggur, who is now the owner of it. This house is conveniently situated for the attendants on the female sick. It appears very objectionable that any of the ground of the hospital premises should be in the possession or be the property of a private individual.

INFORMATION received from the Medical Officer regarding Persons belonging to Her Majesty's 3rd Dragoon Guards who were present at Ahmednuggur, between 1st September 1864 and 31st August 1865.

	Average Strength.	ADMITTED SICK.				REMARKS.
		TOTAL.	Fevers.	Diarrhoea and Dysentery.	Hepatic Disease.	
Officers - - - - -	20	56	13	9	3	Three children treated and died out of hos- pital, one of whom for dysentery.
Non-Commissioned Officers -	38	48	7	7	3	
Rank and File { Married - -	23	30	9	2	-	
Single - -	79	645	123	47	19	
Women - - - - -	32	23	7	5	-	
Children - - - - -	48	11	6	3	-	

RECOMMENDATIONS for the IMPROVEMENT of the CANTONMENT and the CAVALRY LINES, BARRACKS, and HOSPITAL.

(1.) That the brigade parade ground be surface drained.

(2.) That the hollows in the ground between the Sudur Bazar and church on the one hand, and the Bhingar Nulla on the other, be filled up as earth and dry building rubbish become available for the purpose.

(3.) *Barracks.*—To complete the accommodation requisite for the established strength of a cavalry regiment, after deducting the present ratio of married men, new barracks for 158 men are required.

For the present barracks it is required—

(4.) That a saddle room be built.

(5.) That the front verandah be then cleared of the saddle racks, and be used as a day room.

(6.) That the serjeants' rooms at the ends of the barracks be provided with fixed louveres in the arch heads over the doors and windows, for ventilation.

7. That

(7.) That each barrack be provided with a temporary urinary with bamboo sides, and placed at the distance of 10 feet from the left rear angle of the main building.

(8.) That the present urinary building be converted into a bath room by lengthening it three feet towards the barrack, from which there will then be a descent of three steps instead of five as now. By heightening the walls to 11 feet and giving more window light. By making three compartments separated by partitions six feet high. Each compartment four feet square, and provided with doors for privacy, two of them to be fitted as shower baths, each with a reservoir to contain 10 gallons of water, and with a pipe having a rose nozzle, delivering slowly at a height from the ground of at least eight feet. Each compartment to have a small fixed seat in one corner at the height of a foot and a-half. The third compartment to be fitted with a perforated glazed vessel of from 9 to 12 inches diameter, raised on a support or pillar to a height of two feet and a half against the outer wall, and projecting from the wall sufficiently far to allow of a man stooping over it conveniently for private ablution. There should be over the vessel a pipe with a screw-down cock, delivering only a very small stream of water. The water should be supplied by pipe from the iron cistern. The perforation in the vessel should allow the water to flow away by pipe along with the other waste water of the ablution room.

9. The ablution room at the end of the barrack to have its masonry bench removed, and to be provided with fixed basins with overflow and discharge pipes and supply pipes with taps, as figured in Plate XV. of the Volume of "Suggestions by the Barrack and Hospital Improvement Commission."

10. For each barrack there should be a plate iron 500 gallon cistern, which should be placed over the entrance of the bath-room on a masonry support, at a sufficient elevation to supply through pipes by gravitation, both the reservoirs of the shower baths and the taps for the basins of the ablution room. The cistern to be filled by force pump.

11. The waste ablution water should be drained by pipes to pits sunk in the gravel close to the bank of the great nulla and above the level of its bed, so that the water may filter through or be absorbed in the gravel, or, if it be practicable, to drain to the rear of the lines. Unless used for gardens, the spot selected should be at least a furlong from the officers' houses.

12. *Barrack and other Latrines.*—That they be provided as soon as possible with soil pans fitting close up to the seat.

On representation made by the commission at the time of the inspection, the Brigadier General gave orders for the immediate discontinuance of the use of the cesspits, earth in a sufficient quantity to absorb fluid excreta being ordered to be used.

13. *Canteen.*—The floor to be paved.

14. It is recommended that a large iron-roofed lofty shed, open at the sides, and supplied with benches, be provided as a common day room, in which the men may meet and may have refreshments if they choose, but not liquor. This would relieve the now over-crowded canteen.

Gymnastic apparatus might be erected in this shed.

15. *Cook Houses.*—The neighbouring buildings should be joined, and have the fire ranges lower and in arched or domed recesses, having chimneys to carry off the smoke. They should be better lighted by windows. The sinks should be raised to an elevation that will admit of a tank cart outside receiving the water and fluid refuse. The cesspit should then be abolished.

16. *Library.*—The present library should be enlarged by adding to it the centre room, a wide archway being opened in the partition wall; and the room, when thus enlarged, should be paved.

17. The punishment shed, now occupied as a canteen by the artillery, should, so soon as available, be converted into a refreshment room for the use of those who frequent the library.

18. *School Rooms.*—New school rooms for adults and children should be erected. A portion of the site of the former gunshed, now the regimental workshops, seems eligible for the purpose.

19. *Ball Alleys.*—Both sides of the double fives court should be given up for the use of the men. An officers' racket court should be otherwise provided for.

20. A covered American skittle alley should be provided for the men.

21. *Workshops.*—The sanctioned improvement of the ventilation of the regimental workshops should be carried out.

22. *Plunge Bath.*—Strong fixed wooden benches should be provided, and also pegs for the men's clothes when bathing, should be firmly fixed in the walls.

23. An urinary, such as that recommended for the barracks, should be erected at the

north-west corner of the building. A doorway by which to approach it should be opened at the inner end of the north wall, and the passage should have its sides screened.

24. *Staff Serjeants' Quarters.*—The ventilation should be improved by inserting in the arch heads over the doors and windows, fixed louvres in frames made to revolve on a vertical axis.

25. *Family Quarters.*—The ventilation should be improved by the insertion of fixed louvres over all the doors and windows.

26. There should be a ridge ventilator to the quarters of each family, the area of the exit opening being at the rate of a square inch for every 15 cubic feet in the apartments. As the aggregate space in the two rooms, calculated from the design of those on the Gorporee plan, is 5,460, a cylindrical iron plate ventilator, if such be used, should have a diameter of $21\frac{1}{2}$ inches, and it should be defended from the admission of rain by a conical cover, the lower edge of which should descend six inches below the level of the upper lip of the cylinder; and the cover should in no part be nearer to the cylinder than $4\frac{1}{2}$ inches, thus leaving a zone of exit for foul air equal in area to the transverse section of the cylinder.

27. The verandahs should be double tiled.

28. A gutter to carry off the rain water should be made along the rear of the family quarters at the distance of six feet, and the surface of the ground, which is now on a level with the floors of the quarters, should be made to slope from the edge of the verandah, and should be made hard with rammed moroom or gravel.

29. The privies should be paved.

30. The waste ablution water should be conveyed away by pipe along with that of the barracks.

Quarter Guard.—As the present building is greatly deficient in accommodation for the guard as well as for prisoners, and as its plan is such as to preclude its being sufficiently improved for a guard room, it is recommended—

31. That a new quarter guard be built, with a detention room according to the standard plan, and that the present building be utilized by being converted into detention cells in connection with the guard.

32. It is recommended that, without delay, the privy and urinary be improved.

33. That a gutter be made along the rear of the guard building, at a distance of eight feet, to carry off the water when it rains, and that the ground be sloped towards it from the edge of the verandah.

34. *Hospital Guard.*—The building should be enlarged so as to give each man (deducting sentries) the same space as he is allowed in barracks. It should have glazed casements. Also a paved place in a sheltered part of the verandah with pegs on which relieved sentries may hang their wet cloaks.

35. *Solitary Cells.*—A privy and an ablution room should be at once provided.

36. The present small cells should be replaced as they fall into disrepair by new ones of the regulation size.

37. *Horse Lines.*—The stables that have yet to be built should have continuous roof ventilation.

38. The litter should not be deposited to windward of the lines, or of the Suddur Bazar, but should be carried to some spot south of the cantonment.

39. *Hospital.*—According to the ratios proposed by Lieutenant Colonel Crommelin, accommodation for 23 cots is wanting. It is recommended that in supplying this, the deficiency according to the standard plan, the new building be placed on the left flank of the present main building, but with an aspect only one point to north of west.

To make room for the new building, the single rooms for insane or delirious sick, and the isolation ward, which is now objectionably near to other buildings, would have to be removed, and also the houses now occupied by the bandmaster and the farrier major.

40. The removed isolation ward should be built on or near the site of the hindermost small store room, in rear of the farrier-major's quarters.

41. The single wards for insanes should be rebuilt also in rear, and at a greater distance than now from the main hospital.

42. The two wards of the present main building should be improved by the rear verandah being cleared of its present enclosing walls and partitions, and by opening, in the rear wall of the wards, doorways corresponding with the windows on the opposite side, the doors to be half glazed. The surgery and dispensary should have accommodation in the ground floor of the new building.

43. The left end verandah of the same wards to be also thrown open.

44. The enclosing walls and partitions in the rear verandah of the detached ward to be in like manner cleared away, and doorways to be opened in the rear wall of the ward, as proposed for the other two wards.

45. The ablution rooms to be furnished with fixed basins, with overflow and discharge pipes, supplied by tap and pipes from elevated iron plate cisterns, to be filled by mechanical means.

46. In each ablution room there should be two screened compartments with doors for privacy, one furnished with a tub bath, the other with an efficient shower bath. There should be arrangements for supplying warm water in the lavatories as well as in the bath compartments.

47. The waste ablution water should be carried off by pipes to the watercourse in rear, in the way recommended for the barrack lavatories.

48. The latrines should be at once supplied with soil vessels fitting close to the plank seats, to render it impossible for fluid excreta to fall on the pavement below.

It was arranged with the General Officer commanding the Brigade, that the use of the cesspits should be at once discontinued.

49. The latrines should have roof ventilation.

50. The cook-room should be improved by having its pavement relaid, and by having the fire range in a domed recess with a chimney.

51. It was recommended at the time of inspection that no waste water or fluid refuse should be allowed to pass from the hospital cook-room, but that all should be thrown into pails, which should be carried away by the sweepers. This arrangement should be continued.

52. The rear quadrangle should be thrown open by the removal of the apprentices' room and the apothecary's stores. These might probably be accommodated in the ground floor of the new building.

53. The dead house should have a small door made under its broad window, and but half of its width. This should open into a narrow paved passage about $2\frac{1}{2}$ feet wide, having a screen wall 5 feet high. The end of this passage towards the front of the building should also be screened.

54. *Female Hospital*.—All the verandahs should have their enclosing walls and partitions removed, and glazed doors should be put in the rear walls of the two wards.

55. Roof ventilators should be made with outlets of a square inch of area to 15 cubic feet of room.

56. An ablution room and a privy under the same roof, but separately ventilated, should be built about 10 feet from the left rear corner of the hospital, and it should be approached by a covered passage.

57. The neighbouring house, which has been alienated to a private possessor, should be obtained by Government, and should be converted into quarters for the matron and the assistant matron.

ARTILLERY LINES.

The artillery lines, covering about 120 acres, are nearly S.S.W. of the cavalry barracks, and occupy the south-west end of the cantonment, where semi-permanent barracks for a detachment of infantry were erected at the time of the mutiny. When the head quarters of the artillery were removed to Kirkee, the cavalry took possession of the artillery barracks and the troop of horse artillery occupied the infantry barracks. Those latter barracks, however, were considered so bad and unwholesome for the men, that they were abandoned by them, and converted into stables.

Since that time the artillery men have occupied four of the barracks of the cavalry, and have shared in the use of several of their subsidiary buildings; those buildings and barracks have been already noticed in the report of the inspection of the cavalry lines. The artillery has its own male and female hospitals, a quarter guard, and stables.

Barrack Site.—A site for new barracks, according to the standard plan, has been selected and reported on by a station committee. The ground, like that of the greater part of the cantonment, is mostly clayey and retentive of moisture, or black soil, and there is only a limited portion of it that is sandy or gravelly. This portion is on the north-western gentle declivity of the continuation of the rising ground on which the cavalry barracks are built. On the summit of the ridge and its south-eastern slope there is a layer of black soil, which, by sinking trial pits, was found to be in some places five feet deep.

The position of the female hospital which has lately been built, limits the extent of available site for the proposed barracks, and although it would be preferable to have the

three buildings in line, it may be found necessary to place them in echelon. It is very desirable that a due interval, not less than a hundred yards, be left between the hospital and the nearest barrack, and that the new buildings do not obstruct the breeze which the hospital should have.

It is found that the Station Committee has recommended that the barracks should have a west south-west aspect, in order that the occupiers of them should not have the annoyance that they would experience from the dust borne by the prevailing wind, were they to face that wind.

The great advantage that accrues from having thorough perfilation in barracks, ought not to be relinquished on account of the inconvenience that is said to have been experienced in the cavalry barracks from the dust in the hot season, since by means of wet tatties, and the proper management of the glazed shutters of the ventilators, that inconvenience could be avoided or greatly lessened.

From a table of 730 observations, made morning and evening, on the direction of the wind during 12 consecutive months, from July 1861 to June 1862, which was prepared by the medical officer of the Native Infantry Regiment stationed at Ahmednuggur, it is found that the number of half days on which the wind blew from the different points of the compass were—

North	-	-	-	-	-	23	South	-	-	-	-	-	18
N.E.	-	-	-	-	-	93	S.W.	-	-	-	-	-	127
East	-	-	-	-	-	8	West	-	-	-	-	-	89
S.E.	-	-	-	-	-	52	N.W.	-	-	-	-	-	320

And from a table of the results of observations made at the Civil Hospital in the city morning and evening during the three years 1862 to 1864, it is found that in the 2,192 observations the direction of the wind was from the

North	-	-	-	-	in	50	South	-	-	-	-	in	14
N.E.	-	-	-	-	„	381	S.W.	-	-	-	-	„	421
East	-	-	-	-	„	29	West	-	-	-	-	„	153
S.E.	-	-	-	-	„	148	N.W.	-	-	-	-	„	996

The number of days in the year on which the wind was from the south of west was comparatively small, yet because it blows from that direction in the hot season, when the influence of the breeze is most to be desired, the aspect of the barracks should be such as to allow of some benefit being derived from it, while profiting from the more prevalent wind that blows from the N.W. at other seasons. This combined object it is thought may be attained by making the buildings face one point to the north of west.

Quarter Guard.—The guard-room is a central apartment, on each side of which the verandah is enclosed to form places of confinement for prisoners. The floor is earthen, the tiled roof is unventilated. The windows are closed with plank shutters only. It was too small for the guard, part of which had therefore to sleep in a tent. The detention rooms are deficient in ventilation. This guard-room is far away from the site chosen for the new barracks, and it is understood that it will be soon replaced by a new building at the new site. Were it expected that the present site of the guard would continue to be occupied, all the defects that have been mentioned would require to be remedied, and this would still involve the erection of a new building.

Horse Lines.—These are to the north-west of the men's hospital, at a distance of only about 175 yards from the building. The "temporary barracks" formerly used by the men are occupied as stables.

The litter was found to be deposited to windward of the cavalry barracks for sale. It is purchased as food for the buffaloes that give milk for the inhabitants of the cantonment.

Drainage.—The natural fall of the ground from the new site of the barracks is towards the Bhingar Nulla below the cantonment. There is no artificial drainage.

Hospital.—It is in a line with the cavalry barracks and hospital, and at the distance from the enclosure of the latter of about 460 yards. It has the N.W. by W. aspect which they have.

It is a ground-floor building consisting of two wards communicating by a wide archway. The walls are of brick and lime mortar. The plinth is but little raised. The floors are paved and the roof is tiled. The wards are each 60' × 24', giving 2,880 square feet, which, at the lately proposed rate of 130 feet, afford accommodation for 21 sick, or about the regulated number for which provision has to be made, at the rate of 15 per cent. of strength, as in small bodies of men. The walls are 21½ feet high, and there are clerestory windows provided with proper revolving glazed shutters. The windows in the front of the wards are so distributed as to allow of a cot being placed between every two; they are provided with glazed casements. The verandah in front is open; that in rear is in part enclosed to form a surgery and other auxiliary accommodation, and this arrangement occasions obstruction to the ventilation of the wards, from there being left but one window and a door, with much dead wall between them. Sanction had already, it was said, been given to clear the rear verandah of all its present enclosing walls and partitions,

tions, and to open windows or doorways on that side of the ward, symmetrically as to position with those in front.

Adjoining this new hospital there still remains the old building of "temporary" construction, which was now to be appropriated in part for native sick, while part was to be paved and converted into a surgery and storeroom, to supply the place of the present ones, that are to be removed from the rear verandah of the new building.

Latrine.—At the right rear angle there is a new latrine which has not yet been used. It is approached by a covered passage 58 feet long. It has so many as eight partitioned seats. The new regulation soil-pans had not yet been supplied. The compartments have no doors nor screens in front.

Ablution-room.—It is at the left rear angle of the hospital. The floor is but partially paved. There is no screened compartment for bathing. The appliances are merely such as have hitherto been usual in hospitals; there was not sufficient command of water, and the waste water was collected in a cesspit.

Cookhouse.—It is old, and some necessary alterations had already been arranged for.

Female Hospital.—It is a new building, not yet completed, situated to the south of the male hospital. It has a W.S.W. aspect. There are two ground-floor wards, with broad verandahs, which are being in part enclosed to make quarters at the left end for the matron, and to give a bathing-room and a privy at the right end. In thus utilising the verandah, the intended end windows of the ward have been built up. The wards are insufficiently ventilated. The position of a proposed small cook-room for the matron had not yet been fixed, and the Commission recommended to the executive engineer, that it should be at the distance of 20 feet from the left rear angle of the main building, where her quarters are.

The hospital premises were not yet fenced.

Isolation Ward.—This building, which is at present occupied as a female hospital, is between the new hospital and the male hospital. It has an earthen floor. There are no roof nor other ventilators, and the open verandah is only seven feet wide, and is covered with only a single layer of tiles.

The B troop of the E brigade Royal Horse Artillery has been at Ahmednuggur only since 1st January last.

RECOMMENDATIONS for the Improvement of the ARTILLERY LINES and HOSPITAL.

58. *Barracks.*—It is recommended, for the reasons stated, that the aspect of the proposed new barracks be west by north.

59. *Quarter Guard.*—That, whatever the site for the guard may be, a new building be erected, affording accommodation of the larger amount and better kind that is allowed by the new rules.

60. *Hospital.*—The proposed clearing of the rear verandah of the main building should be carried out, and the openings in the rear wall of the ward, to correspond in situation with the windows in front, should be doorways, furnished with half-glazed doors.

61. The eight compartments of the new privy being more than enough, the two farthest from the entrance should be reserved for keeping the close stools that may have to be used in particular cases; that part should have a door to separate it from the rest. The compartment nearest the door of the privy should be fitted to hold a urinal. The other five compartments should, without delay, have soil-pans fitting close up to the plank seat. Fixed screens, such as are shown in the privy in the standard plan of quarter guard, should be erected before the entrance of the compartments.

62. The pavement of the ablution-room should be completed. The room should be provided with fixed basins, with overflow and discharge pipes, and supplied by tap from pipes leading from an elevated plate-iron cistern of the size to contain 500 gallons. The cistern should be placed at an elevation sufficient to feed a shower bath that has a fall of eight feet. The cistern should be filled by force pump.

63. A compartment, four feet square, should be screened off in the ablution-room for a shower bath. The shower should be delivered by a pipe with a rose at the height of at least eight feet from the ground.

64. The waste water of the ablution-room should be carried by pipe to the neighbourhood or the watercourse in rear, or to be used for gardens.

65. A moveable pail should be used in the cookhouse for waste water and fluid refuse. No cesspit should be allowed.

66. *Female Hospital.*—The right end verandah should be cleared of enclosing walls and partitions, and the windows of the ward that have been built up should be opened out

out as doorways and provided with half-glazed doors. The other windows of the wards should also be converted into half-glazed doors.

67. The archheads over the doors and windows should be fitted with fixed venetians, in frames made to revolve on a vertical axis.

68. An ablution-room and a privy under the same roof, but separately ventilated, should be erected at the distance of 10 feet from the right rear corner of the verandah of the hospital. This building should have a covered approach, and the side of this passage next the male hospital should be closed with honeycomb masonry.

69. The premises should be fenced.

70. *Isolation Ward.*—The building proposed for this use should be paved; it should have roof ventilators and ventilators over the doors and windows. The verandah should be widened to 10 feet, which the slope of the roof will allow. The verandah should be double tiled.

NATIVE INFANTRY LINES.

These lines occupy 131½ acres, and are at the highest part of the cantonment, and on dry ground, consisting of moroom, or the gravel of disintegrating trap, through which the rock here and there protrudes, and the ground has a fall in front and in rear, and also towards the city.

The lines were originally laid out for a regiment 1,200 strong, and lately they afforded accommodation to the *depôt* and families of a regiment absent on field service, in addition to the regiment that now has them. On the *depôt* leaving Ahmednugur, the huts they vacated were found to be in a very filthy condition, and were removed. The streets run east and west, and thus are favourably directed for ventilation by the prevailing winds, but this arrangement is rendered in a great degree nugatory by the native officers' huts being built in continuous lines across the west end of the streets, and having behind them a continuous belt of gardens with trees and lofty shrubs, enclosed by a wall seven or eight feet high.

The huts are badly constructed and their walls are much too low. Many had the thatch in bad order. This was attributed to the men having difficulty in meeting the increasingly heavy expense of renewing it. From what was learnt, the former occupants of the lines had been in the habit of making pits in the ground close behind their huts for waste water. The ground has thus, it is feared, become to a considerable extent impregnated with organic matter.

The right, or south flank of the lines, is only 200 yards distant from the city wall. The interval is of rocky ground, and is occupied only by the regimental hospital.

On the west side of the lines, behind the gardens of the native officers, there is the regimental bazar, through which the Aurungabad road passes. The bazar is said to have a population of 185 persons, of whom only three or four families are considered by the officer commanding to belong to his regiment.

The houses on the east side of the road, or that next the lines, are mostly mean mud huts. On the west side of the road there are a few substantial houses, among which there is one conspicuous upper roomed one. Judging from plans of different dates, encroachments by intruders appear to be increasing, and there is now an interval of only 125 yards between the bazar and the city wall, and if the evil be not remedied, the men's lines will soon, it is feared, be continuous with the town.

The ground between the lines and the town was clean up to the base of the city wall, as indeed it was found to be both in all the part of the cantonment that is bounded by the wall, and elsewhere.

Close under the wall, near the Mungul Gate, there are a few huts that are occupied by persons who do not belong to the cantonment, and there are some huts round a tomb near the gate, that form a nucleus round which others are likely to be congregated.

With reference to the two propositions that were lately made by the former officer in command of the station—the first, that the lines should be rebuilt and tiled; the second, that the lines should be removed to another site at a greater distance from the city—the Sanitary Commission visited the ground and was accompanied in its inspection of the lines by the Brigadier General and by the officer commanding the regiment, who favoured it with all the available information they had, and with their opinions on the subjects of investigation.

There was no site mentioned to the Commission as preferable to the present one, nor was there any seen within the present cantonment limits that would be, in all respect, equally good. To find an open, elevated, and dry site, it would be requisite to go considerably beyond the present military limits, and any such extension of the now wide-spreading cantonment, is considered to be inexpedient. The chief objection to the present site is its nearness to the city. This objection would be stronger were the intervening ground not under military rule, which enforces cleanliness up to the wall.

To improve the present lines and site it is recommended that—

71. The lines be rebuilt as nearly according to the new plan as the ground will admit of. The right or south flank should on no account be brought nearer to the city wall than it is now, but it should rather, if possible, be removed farther from it. Even so little

as 20 yards added to the present interval, is an increase that under the circumstances would be of advantage.

According to the new plan of native infantry lines, the streets would not be obstructed by the native officers' huts.

72. The new huts should be tiled. Besides the smaller liability to fire and other advantages that there are in tiled huts, the ventilation is much freer through the interstices of the tiles than through the thatch.

73. The present huts of the native officers, and the gardens with their walls, should all be removed.

74. The ground between those gardens and the road which passes through the regimental bazar should at once be cleared of all huts or houses belonging to squatters, and none of the houses there that belong to persons who have a legal property in them should be allowed to be rebuilt, but on their falling into disrepair should be removed, and the ground on which they stood should be kept unoccupied.

75. As the Aurungabad road, where it passes through this bazar, is said to be inconveniently narrow for the traffic, it may be found necessary to widen it. If this takes place, the houses that are removed in doing so should not be rebuilt.

76. The clear interval between the bazar and the town wall that has been lost should be regained, and when the lines are newly laid out, the distance of their right flank from the town wall, which is then determined, should be made also the measurement of the interval between the bazar and the city. The houses falling within that interval should be removed, compensation being given to the owners. The substantial upper-roomed house which has been mentioned might be excepted, on account of its probably high price; but when it falls into a state requiring it to be rebuilt, it also should be removed.

77. The huts near the Mungul gate of the town and those beside the tomb, that have been mentioned, should be removed.

FORT.

It stands in the part of the cantonment that is between the city and the Bhingar Nulla. It is nearly circular, and about 600 yards in diameter. Its stone walls are high and in good repair, and it is surrounded with a deep ditch about 50 feet broad, the bottom of which was mostly covered with coarse grass and shrubs. At the south end the water was not fully drained off.

The fort is at present used only for ordnance and barrack stores.

78. It is desirable that the ditch should, if practicable, be more perfectly drained than it now is, so that water may not lodge in it.

BAZARS.

The Native Infantry Regimental Bazar has already been noticed, and certain recommendations regarding the Sudur Bazar have been included in the separate report on the village of Bhingar.

There is another bazar, which belongs rather to the town than to the cantonment, although it is outside the walls and is under military rule. It is the Myndae, between the Jaenda gate and Bhuwa Bungala gate. It is a hamlet containing the tomb of the Bhuwa and a considerable number of mud huts that are placed, with but little regularity, on uneven ground, without any made road among them. Among other inhabitants there are butchers. They slaughter the animals at the cantonment slaughter-house.

The ground around and among the huts was clean, but the place is unsightly, and as the population have no apparent connexion with the requirements of the cantonment, it seems—

79. To be advisable that the ground should be gradually resumed as the huts fall into decay.

It may be mentioned that the cantonment magistrate follows a method that seems to answer well for maintaining cleanliness in the premises of the residents in the bazars. He provides for the regular visits of sweepers and for the removal of filth from the privies of all who contribute a small sum—it is either half an anna or an anna—monthly to a general fund that is formed for the purpose.

WATER SUPPLY.

There are very few wells that give good drinking water, and in the cantonment well water is used only for the irrigation of gardens and for the plunge-bath.

Drinking water of good quality is supplied from cisterns fed from underground masonry conduits that bring it from the springs on the sides of the hills from four to six miles distant. The Kapoorwara conduit supplies the Native Infantry lines, and the Bhingar conduit supplies the European part of the brigade and the Sudur Bazar. The supply continues throughout the year, but it is rather scanty in the hot season.

A grant has been given recently to restore the Shahpoor aqueduct, that by it the supply

of water to the European troops may be increased. This aqueduct has its source in a ravine at the foot of the hill on which Salabut Khan's tomb stands, and used to give water to the fort of Ahmednuggur. The ravine is small and of but little depth, and there are two masonry dams across it, which are said to have been built about 500 years ago, at the time the conduit was constructed. The upper dam is now useless, as it has a breach in it. The lower one is unbroken, but the tank that it once formed has been completely silted up, and the accumulated soil is cultivated.

It is from the base of the second dam that the conduit is being restored. Near its head the conduit passes under the high road and opens into a large open dipping well, which also is being restored from the ruin caused to its masonry by a tamarind tree that grew too near it. On the side of the well opposite to where it enters, the conduit takes a fresh departure.

This well is within a few feet of the highway, and is close to a Seraee, where poor travellers halt. It is very objectionable that the water should be thus exposed near its source to defilement from the dust of the road, and from impurities conveyed by those drawing water from it, and perhaps bathing in it.

The well has long been used by travellers, and they might still have a cistern provided for their use, to be filled from the aqueduct, but—

80. It is most desirable that the well should be covered and closed, so that the bulk of the water may be defended from pollution.

SANITARIUM.

The large lofty octagonal building that stands over Salabut Khan's tomb has for some years past been used as a barrack, to which some of the European troops are removed in the hottest months.

It is five-and-a-half miles distant from the fort, and nearly due east of it. The hill is said to rise 617 feet above the plain, so that the elevation above the sea-level is only about 2,500 feet. The relief from the heat that is said to be experienced by those who resort to it is, however, considerable. The road up the hill was found to have been in great part washed away during the rains, there having been no drains or other means of diverting the current of water.

The top of the hill is terraced, and the building is on all sides exposed to the wind.

The tomb is in the basement, and over it there is a ground floor, consisting of a central hall doomed at a great height, and a closed verandah, which has been partitioned and appropriated for stores and other purposes. Between the basement and the domed roof there are two lofty tiers of gallery; the lower has had both its inner and outer archways built up, and the outer ones have been furnished with glazed casements to render it habitable. It is in this gallery that the detachment is accommodated, and it gives sufficient area for about 35 or 36 men. The upper gallery might in the same way be made to accommodate a similar number; but the means of amusement and exercise are very limited, excepting to those who are able and like to ramble on the neighbouring stony hills in search of game. There is a roughly built privy.

81. Proper ablution accommodation, which is still wanting, should be provided.

It is recommended likewise—

82. That the upper gallery also be prepared for the accommodation of men.

REPORT on the Sanitary Condition of the TOWN of SHOLAPOOR.

(Inspected in January 1865.)

SHOLAPOOR, in latitude $17^{\circ} 40'$, and longitude 76° east, is about 182 miles from the sea, and has an elevation above it of about 1,820 feet. Until the close of last year it was the head quarters of a zilla, but now it is included in the Poona Collectorate, and is the chief town of the Sub-Collectorate of Sholapoor.

The country around is seen, when passing over it, to be undulating and intersected with watercourses; but there are no hills near enough to break the even line of the horizon. The watercourses are mostly dry, excepting in the south-west monsoon; and, with the exception of a very scanty supply in the Balaeche Ora, the nearest running water is the River Seena, eight miles distant.

Much of the neighbouring land is gravelly and barren; on that which is arable, cereals, pulse, oil seed, and cotton are cultivated, and the crops are dependant on the rain and dew. The annual rain-fall has been stated to be 26 inches, and to be subject to wide variations.

The mean temperature is about 80° Fahr., with a yearly range of about 30 degrees.

The ground on which the town and military cantonment, that adjoins it on the south, stand, resembles that of the surrounding country, being in part rocky and gravelly, and in part composed of productive soils, both brown and black. The rock is altogether trappean, and its beds are mostly amygdaloidal, the contained minerals being generally zeolites.

The town is built on slightly elevated ground, having a fall to the east and to the north. There is a high commanding mound on its south-east, formed of the material excavated

excavated from a large tank on the south of the city, named after Sideshwur, a Hindoo idol. This idol has a temple on an islet in the tank.

Sholapoor, in the year 1851, was reported to have 30,819 inhabitants, occupying 5,409 houses, of which 2,904 were flat-roofed, 295 tiled, and 1,810 were thatched. Since then a census has not been taken. From the increase that is apparent in the size of the eastern suburbs, it is probable that the present population is now considerably greater than what is shown above.

The ground belonging to the town, that is thickly built on, is roughly estimated to be 281 acres, and of these 214 are within the wall, and 67 acres are suburban; were the gardens and portions of ground that have on them only thinly scattered habitations to be taken into the estimate, the suburbs would appear very much larger.

The wall is high, and is built continuously round what was once all the town; it is without bastions or military works, and owing to the fancied security from robbers which it gives to those whose dwellings are within it, a yearly grant of 500 rupees is made from the municipal fund to keep it in good repair. A large portion of the taxpayers reside outside the wall.

A considerable extent of ground within the wall is still vacant, and efforts made by the magistrate of the zilla to draw the extension of the buildings in that direction failed, and a plot of ground outside the wall on the north-west, that was given to the Wudur, a low caste working as stone-cutters, whose impure vicinity the other inhabitants disliked, remained unoccupied, or was soon deserted by them. The want of water is the chief known objection to the occupation of the west end of the town. The only wells are on the east, and in this direction the suburbs have grown. The municipality lately applied for Government assistance to include in the town some land for building purposes on the north-east, and in or near which are situated the best wells from which drinking water is procured. The assistance asked for was not accorded, and for sanitary reasons it is desirable that the ground about the wells should not be built on, as its occupation by dwellings would sooner or later lessen the purity of the water.

The present magistrate has renewed the endeavour to draw the population westward, and with better success. New streets and a large market-place are laid out, and some monied men, as a speculation, are building, with a view to letting the houses for rent. This part of the town is called Nuwa Peth.

The town is divided into peth or wards; these are very unequal in size. Mungulwar Peth and Kusba Peth cover nearly the whole of the walled part of the town, the Mungulwar being the north-eastern, the Kusba Peth being the western and southern portions. Sookurwar Peth is very small, and lies in the south-east corner, between the wall and the road running from the Beejapoor Gate to Bugwan Ves. Nuwa Peth appears to be a new name given to the south-west part of Kusba Peth, near the new gate.

The extra-mural peth also differ much in size. They are in the following order, beginning with the most northern:—Gooroorwar and Gunesh, Baboo and Sakur and Somwar, all on the east, Sunwar and Padshaon, the south-east, and Begum and Sideshwur Peth, on the south. The last one mentioned has but a few huts on it; and in Begum Peth are the gaol premises, and a considerable extent of open ground, while Padsha Peth is mostly occupied with cultivated fields and gardens. The other peth are nearly fully built over.

There are nine gates or ves for ingress and egress. They are the Fort Gate, Panee Ves, and Beejapoor Ves, on the south, Daree and Koombur Ves, on the east, Tooljapoor Ves, on the north, Balace Ves, north-west, and Dehgaon Nuwa Ves, on the west. The Beejapoor Gate-street is about 1,000 yards long, and runs in nearly a straight line through the city to the Tooljapoor Gate. Chatee Gullee crosses it at right angles, and passes from Koombur Ves to Balace Ves, and these are the only two streets that have generally known names. In Beejapoor Gate-street, where it crosses the limit between Sookurwar and Mungul Peth, there is a large gateway called Bugwan Ves. Northward of this the street is wide (perhaps 40 feet), and lined with shops, and would be spacious were it not that there is along its middle a row of little shops, or masonry-built stalls, in bad repair or ruinous, called Men Bazar. Chattee Gullee, or the cloth market, is in like manner encroached on and disfigured by its Men Bazar. It is the desire of the magistrate to have these Men Bazars removed; but the obstacles to this measure have not yet been overcome. With the exception of these two streets, and those recently laid out in Nuwa Peth, the roads and alleys are narrow, crooked, and interrupted in their course, and unfit for traffic by wheeled vehicles, and they are, besides, too few for free traffic and intercourse by those on foot. The principal ones are metalled, and have open side-gutters lined with stone. Owing to encroachments, and to the non-enforcement of the regulation requiring houses to be built in line instead of with projecting angles, the streets are zigzags. A large portion of the smaller streets are not metalled, or if they have ever been so, they are now so much out of repair as to retain no trace of it. To enable the municipality to guard better than heretofore against encroachments on public ground by private persons, a survey of the town was made, but it has not yet been delineated. The sum of 2,000 rupees has been devoted to this useful work.

The general appearance of the town, in passing through it, is that of an ordinary village. The houses are, with the exception of those in the Beejapoor and Chatee Bazar, in enclosures that present towards the street their dead walls of sun-dried bricks, or stone and mud, generally from eight to twelve feet high, a small doorway being the only opening seen. On entering there is a yard from 10 to 12 feet square, on the sides of which are the dark rooms or cells in which the people live, having three or four feet of open

verandah before them. The yard may communicate with one or more others, or there may be a labyrinthine succession of such courts. Even the houses of the more wealthy are masked towards the street by a more or less roughly built dead wall. Very few houses, except in the bazars, have windows opening towards the road; none were seen with glazed casements. The rooms are generally exceeding sparingly ventilated, and lighted by an aperture about a foot square, passing upwards in a slanting direction through the thick wall. Visitors are received in the open corridor or verandah that surrounds the small entrance court.

The houses within the walls are visited by sweepers at longer or shorter intervals. The privies are vile and offensive, and in the enclosures of the poorer inhabitants they consist of a screen wall, behind which there is no vessel, not even a pavement, merely the bare ground, which thus becomes saturated with filth. The foul waste water of houses abutting on a street with a side-gutter, is discharged into that gutter, there to evaporate.

When there is no gutter, an unglazed earthen jar is sunk at the side of the lane or street, and a pipe passing through the wall pours the liquid into it. When full, the jar is supposed to be carried away outside the town to be emptied. Some of the wealthier houses have masonry cesspits instead of the porous jar, and in this, as well as generally in the former case, the contents are baled or thrown out on the neighbouring road, there to be absorbed or to evaporate. Many merely dig a hole at the side of the street for the reception of the liquid refuse; and this more pernicious, absorbing cesspit, gives them less trouble than the jar, as a longer time elapses ere it requires to be cleared out. When the time does come for this, the fetid mud accumulated in it is scattered over the neighbouring ground. Were it not for the dryness of the air, human life could scarcely be maintained under these conditions. In a moist climate such prevalent uncleanness would occasion devastating pestilence.

The surface-gutters at the sides of the streets for the monsoon drainage are not truly laid, and do not all pass on their contents. Part of the drains run to the north, while others discharge into the Lenkee, a watercourse on the east, that runs through Padsha Peth, and parallel with the town wall between Sakur and Sunwar and Bapoo Peth, and then between Gunesh and Gooroowar Peth, still northward, towards the Maha Ora (or great watercourse). This Lenkee is the place which a great part of the poor inhabitants of the suburbs frequent, as the public latrines are too far off for many of them, and their own premises, being small, do not afford the shelter that the inhabitants inside the town wall take advantage of in their enclosures. It is, besides, the receptacle of the refuse water from dyers' and tanners' yards, and from a distillery: and, owing to its uneven bed, the foul fluid does not always flow on, but lies in stagnant pools, as was seen at the time of the inspection.

The municipality has done much towards providing latrines for the people, and it is willing to make further provision. At the north end of the town, outside the Balae Ves, there are two ranges, one for males, the other for females, with a hundred seats each. At the north-east of the Toolijapoor Ves there are other two extensive ranges, and on the south, beyond the Beejapoor Ves, there are other two. These latrines have sweepers with carts in attendance, and, although faulty in construction, they are evidently a great benefit to the place.

An attempt has been made to supply another want, and six or seven urinaries have been erected in the town, but they are not used as intended, but are perverted to a more offensive purpose.

There are many merchants in Sholapoor, and they deal mostly in grain and cotton. The chief trade carried on by the people is weaving, and connected with the weavers there are those who dye the yarn. This latter occupation is offensive. The most offensive trades, however, are the tanner's, the distiller's, and the brickmaker's and potter's. It has already been mentioned, that the foul refuse of the dyers', tanners', and distillers' works are thrown into the Lenkee, on the east of the town. The brickmakers' kilns are in Sideshwur Peth at the south part of the town, close to the large tank, and from it the supply of clay is obtained. This clay is sold yearly by auction, and the proceeds of the sale are taken by Government. The fuel for the kilns is the sweepings of the town, that may be daily seen carried out on donkeys to be stored at the kilns for use. Very recently a person, seemingly without authority, has established a brick kiln a little south of the gaol, and close to the gaol burial-ground and to the executive engineer's store. Within the wall potters carry on their trade in Kusba Peth, near the temple of Mulkarjoon. There are no slaughter houses, and both beef and mutton butchers kill the animals in Kusba and Mungulwar Peth, without any regulated supervision of their premises. Milch and labour cattle are kept in extremely filthy houses and yards within the town.

Water is obtained chiefly from the Sideshwur tank, which has been excavated at the south of the town. For some time after the rains this tank presents a surface of water of about 40 acres, but it soon diminishes in extent, and its impurities become concentrated, and in the hot season it dries up. The gathering-ground of the water is east of the cantonment, and a trench to conduct the stream may be seen near the Collector's house and office. The tank has been lessening in depth from accumulation of silt, while the efficient clearing out of the annual deposit has been neglected. Now a retaining wall is being built to prevent the earth and gravel on its banks from being washed into it by heavy rain. Continuous with the tank, there is on its west side the fort ditch. This ditch has generally less depth than the tank, and a swampy bottom is exposed soon after the rains, and, as the surface is very considerable, its injurious effect on the health of the neighbourhood

neighbourhood must be very considerable. During the mutiny the fort was garrisoned by a company of European soldiers, and, if my information be correct, there were 80 per cent. of them at one time suffering from the hurtful malarious influence.

The Sideshwur tank was formerly liable to pollution until the magistrate of the zilla employed some of the district police in protecting it, and although those drawing water follow the ancient custom of standing in it and scrubbing their water-vessels, no other washing or bathing is seen. There are several wide stairs at the sides of the tank, by which the water is reached, and near one of these, called the Gunputee Ghat, between the fort and Pancee Ves, there are troughs at which the people wash, while the waste water is conducted by sewer away from the tank. Near the Pancee Ves there is another range of washing-troughs, with like provision for carrying the waste water in a proper direction. This arrangement is very good.

On the east of Sakur Peth there is Khundoba Tulao, a large quarry hole in which the water flowing from the neighbouring surface collects. This water, which the people consider good, is greatly defiled, for persons were seen bathing and washing their clothes in it, while others were drinking or drawing drinking water from it beside them. The quarried surface is uneven, and a gang of convicts was seen digging gravel without method, and thus increasing the number of pits which the neighbouring inhabitants make receptacles for filth.

At the census of 1851 there were found to be 86 wells available for the people, and 42 of them that, for part of the year at least, gave drinkable water. The present number of wells is unknown. The well water that is most valued, and which is found in greatest abundance, is in the fields on the east of the town. The Joor Baoree beyond Koombar Ves, is especially esteemed, and it was to benefit more from it that it was proposed that the town extension should take place in that direction.

The municipality has been profuse in its liberality to the low caste portion of the people, so that now there is more, as regards water, to foster illiberal caste prejudices among these, who are by other Hindoos considered beyond the pale of social intercourse, than there is among the people of what is called high caste. At the side of the Hyderabad road, where it passes between Gunesh Peth and the Joor Baoree field, there have recently been built four large wells of good masonry, each with its stair for the convenience of drawing water. One of these is for the mhar, one for the mhang, one for the chambar, and the fourth for the dhor, or those who dye the hides which the chambar tans. These people say they will not all draw water from the same wells, and their fastidious or pretentious scruples have been thus expensively cherished by the municipality.

The scarcity of good water has led the townspeople to seek it in the military cantonment, and many have in the hot season been in the habit of sending for it to the reservoir at the Moteebagh. Now a cistern has been built below the embankment of the reservoir to catch the leakage water, and iron pipes, to a length of upwards of two miles, are being laid to the western side of the town.

At the north of the town, and also beside the Sideshwur tank, there are plantations of Neem trees, which a former collector, Mr. Goldfinch, made with a view to their becoming shady places of recreation for the people. The trees are thriving, and promise soon to answer the benevolent purpose of their planter.

The municipality has lately built a vernacular school-house near the Tooljapoor Ves, and the English school-house in the same neighbourhood is being enlarged at an expense of from 10 to 12,000 rupees, of which one-half is to be paid by the town, and the rest by Government.

A charitable dispensary has been established within the last few months, but it lies at present under the disadvantage of the want of a proper house. The difficulty of supplying this want is great, as, owing to the plan of construction followed at Sholapoor, none sufficiently lighted or ventilated, or provided with the most ordinary of the conveniences required for sick persons, can be found ready built.

The magistrate, Mr. Duff, directed my attention to the fouzdar's office and gaol in Kusba Peth. The office is a very low-roofed room with a deep verandah opening on the narrow street, and by that one side receiving all the little air and light it has. We found it crowded with persons who were there on business, and it had a close unwholesome atmosphere.

The gaol on the other side of the road has its courtyard on a lower level than the street, and it was said that in the rains it was a pool of mud. On the left hand there is a broad shed with its roof drooping towards the court so low as that one has to stoop on entering it.

In this the prisoners pass the day and cook their food. On the right hand there is a deep verandah with a roof as low as that of the opposite shed, and approaching it so that the little court between is left but seven feet wide; behind this verandah and opening into it there are three rooms, each 20 feet 4 inches long by 10 feet 4 inches broad and 11½ feet high. The door is of plank, and when it is closed the only apertures for air are two ventilating holes each four inches square in the terraced roof and a window in front 20½ inches high and 14½ inches wide, but this width is reduced to 9½ by the iron bars that obstruct it. One of the three rooms is reserved for female prisoners, and the other two are for males. The number which we were told might be locked up at night in one of these rooms was 12. With that number in it, each inmate would have but 17½ square feet of floor and 201 cubic feet of space, with an inlet for fresh air of 16 square inches and an outlet for foul air of 2¾ square inches only. At this inspection there were 17

male prisoners, each with 25 feet of area and 225 of space, an allowance so deficient as to be very likely to engender dangerous disease.

The zilla or district gaol is south of the city in Begum Peth. It has within the last few years been much improved by the addition of a yard 150 feet wide at its west side. It was somewhat overcrowded, but the judge, who was present at the inspection, stated that a considerable number of the prisoners was to be at once transferred to Kuludghee. The cells called solitary, 10 feet by 7 feet and 10½ feet high, are built in two rows close to each other, and are most disadvantageously situated for ventilation, being but 6 feet from the boundary wall, which is 17 feet high. These cells, that are too small for one inmate, for whom they were designed, were being occupied by two persons. The drains from the cooking places lead towards the gaol garden, about 100 yards distant, but they were found to be choked. There is no proper hospital, and the sick are kept in an insufficiently ventilated and too small a room.

The latrine was as clean as water could make it, but from there being much plaster used in its construction it was offensive. The earthen jars used as urinals at night were offensive, but to lessen their liability to become so, the order was at once given by the judge to coat them with pitch.

The gaol was clean, but the ground immediately beyond its surrounding fence was foul. The prickly pear round the gaol and civil hospital might advantageously be replaced by milk bush. There is an enclosure south of the gaol that formerly was used as a latrine for the prisoners; it is no longer required for them, and it has become the resort of others for vile purposes. The burial-ground of the gaol is beside the enclosure just mentioned, and is unfenced. It is much too near to habitations to be safe, should a fatal epidemic disease occasion many interments to be made in it.

The municipality has no register of burial or burning places. The Moosulman graveyards are mostly on the south of the city, beside the great tank, and there is one between the cantonment and the judge's house. The Hindoos bury their dead on the north, and their burning place is about half a mile beyond the town, at the Balaee che Ora, a water course in which there is the little water sufficient for their religious requirements.

The deaths have for a long time past been registered, but on inquiry it is found that only those that occur within the wall are with any certainty obtained. No dead body is allowed to be carried out of the gates of the town without a note of the circumstance being made. The deaths occurring outside of the wall are recorded by the persons at the gates when the information is brought to them by the friends of the deceased; but it is not obligatory for them to bring it, and there is but little reason to suppose that they often proffer it.

The municipal annual revenue is stated to be from 28,000 to 30,000 rupees. It is raised by an impost on all articles of consumption entering or leaving, with the exception of salt, wood, yarn, and cotton. A house-tax has been initiated in the newly laid out building ground in Nuwa Peth, where the only stipulations made are that each house shall be built in line with its neighbours, and that a rupee a year shall be paid for it to the municipal fund.

Besides the impost for the benefit of the municipality, it is said that a tax is levied for the temple of Sideshwur; this matter it is expected will be inquired into by the magistrate of the sub-collectorate.

For the sanitary improvement of the town of Sholapoor, it is recommended to the municipality as follows:—

1. That advantage be taken of every opportunity that offers to improve and widen the streets until they allow of the easy passage of wheeled vehicles.
2. That measures be at once taken to make straight main thoroughfares, about 40 feet wide, that will completely traverse the town between its opposite gates; as, for instance, from Daree Ves to Nuwa Ves, from Koombhar Ves to Dehgaon Ves, from Panee Ves to Balaee Ves.
3. That straight metalled and guttered roads be made in Gooroowar, Baboo, Somwar and Sunwar Peth.
4. That a latrine for males, and one for females, be erected on one of the banks of the Lenkee or water-course that passes between Padsha and Sakur Peth, and north-east of the gaol garden. It should be from 300 to 350 yards distant from the public road leading from the cantonment to the judge's house, and about the same distance from the civil hospital. This situation appears the best with reference to the wants of the poor people, as it is nearly equidistant from the existing latrines in Sideshwur Peth and those near Koombhar Ves. The design of it should differ from that of the latrines already built, by the recess under the seat being wider (about 15 inches), with a horizontal rest for a receiving vessel about a foot deep, of metal or of strong pottery, made to pass entirely under the seat, and fit its niche or recess in such a way as to preclude foul fluid from escaping over its sides.
5. The present latrines should be improved according to the plan given above, and thus offensive odours from them would be lessened, and their cesspits would be no longer required.
6. Dry fine earth should be laid in the recess before placing the receiving vessels, and should be renewed every day.

7. The

7. The sweepers' carts should have water-tight tanks, and one or more of them should always be available beside each public latrine, for the reception of night-soil brought from private residences.

8. A contract should, if possible, be made with cultivators to take the latrine filth as manure, but not to be used within the distance of a mile from the town.

9. A place for the deposit of filth should be provided at the distance of at least a mile from the town. As, on account of the military cantonment, such a deposit cannot be made in a southern or south-eastern direction, and as the east is occupied by part of the civil lines, while from that quarter, and from the north-east, the wind blows during a great part of the year, it appears that the north is, in this particular case, the least objectionable position.

At the prescribed place alone should all filth, not taken by the cultivators or brick-makers, be deposited.

10. When there are practicable roads through the town, tank night-soil carts should be sent their regular rounds every night to receive from private dwellings.

There are no facilities for systematic house-drainage, and as liquid refuse has to be disposed of, a choice may be made from among the expedients now in familiar use, of that which is least objectionable. The sunk vessel, which can be carried away to be emptied, seems the preferable plan; it can be more easily and effectually emptied than a masonry cesspit, from which the contents have to be baled out. The jars should however not be porous.

11. The jars used in place of cesspits should be glazed or coated with pitch.

12. No kind of cesspit should be allowed in or at the side of a public road.

13. No mere pit in the earth, or absorbent cesspit, should be allowed anywhere within the town or its suburbs.

14. No foul liquid should be permitted to be thrown on the streets, or on any ground within the town. The lenkee, or water-course, on the east of the town, should have its bed smoothed, and have a narrow masonry central gutter, or cunette, of carefully laid gradient, to carry off the water in the direction of its natural outlet.

15. No privy should be allowed without a stone pavement under its seat, and a receiving vessel of metal or earthenware.

16. In granting building sites, there should be added to the other conditions the stipulation, that there shall be sufficient and properly placed privy accommodation for the inhabitants of the houses.

17. The slaughtering of animals should be prohibited within the walls, and it should be restricted to a place north of the town.

18. Dyers' work-places should be allowed only north of the town.

19. Tanneries should be removed to at least a mile north of the town.

20. Potteries should be removed to the same locality.

21. Brick-kilns also should, when practicable, be removed to the locality proposed for the tanneries. Should ownership of the land be urged by those in Sideshwur Peth against removing, then their supply of street sweepings from the town should be stopped by the municipality as long as the kiln owners retain their present place of manufacture.

22. Distilleries should be removed to at least a mile north of the town.

23. The keepers of cattle should be required to maintain cleanliness in their premises.

24. The Commissioners should on all opportunities make their fellow townsmen aware of the great advantage that accrues to health from abundance of pure air, and should advise them, and especially those about to build, to substitute large windows in their rooms for the small openings, or loopholes, that are now common.

25. Three, or more, intelligent men should be employed to visit, at short intervals, the premises in their appointed beats, both within and beyond the walls, and to bring to notice any discovered nuisance, that it may be stopped or removed.

26. It is desirable that the district police continue to guard the Sideshwur tank, to prevent bathing and washing in it.

27. That efficient measures be taken, on a scale commensurate with the magnitude of the work, to cleanse the Sideshwur tank of the mud and silt that are accumulated in it.

28. That a catchpool be made where its feeding trench enters it, to prevent fresh silt from being carried in.

29. That to improve the present washing troughs small screen walls be built, behind which persons may bathe.

30. That at the stairs, or ghat, of this tank there be wooden rails, over which persons may draw water without standing in it with dirty feet. The rails should be made moveable, so that as the water recedes they may be placed a step lower.

31. That in co-operation with the military authorities, steps be taken to improve the condition of the fort ditch.

32. And to fence the side of the ditch nearest the town.

33. That by giving a proper direction to the operations of those quarrying for stone or gravel, in Khundoba Tulao, its reservoir for water be improved.

34. That the ground about that tank, and over which it is fed, be preserved clean.

35. That washing-places, similar to those at the Sideshwur tank, and with their drainage flowing away from the tank, be provided on the outer slope of its banks, and that bathing and washing in the tank itself be prohibited.

36. That no new burial place be allowed on the south or east of the town, that is, between the cantonment or the civil lines and the town.

37. That, if possible, objectionable burial-grounds be now closed.

38. That all burial-grounds, and places for burning the dead, which it is necessary to allow, be strictly defined and be registered.

39. That no burial or cremation be allowed in other than registered ground.

It is recommended to Government in the Revenue and Police Department—

40. That the present unwholesome gaol used by the police fouzdar be relinquished, and one that is unobjectionable, in a sanitary point of view, be provided. That while it is found unavoidably necessary to use the present jail, the occupation of each of its wards be restricted to, at most, four prisoners. A large ventilating grating should be made at the foot of each door, and there should be two large roof ventilators provided; these latter might be on McKinnell's plan, which has a combined inlet and outlet shaft, and each part of the shaft should have a sectional area of one foot.

41. That the sale of clay from the bed of the Sideshwur tank, at the annual auction, be coupled with the condition that it shall not be used for making pottery or bricks within the town limits, or elsewhere than at the place appointed by the municipality for such work.

42. That the brick-kiln, lately established beside the gaol burial-ground, be suppressed. It is thought that the magistrate of the sub-collectorate has already given orders for its removal.

In the Judicial Department it is recommended—

43. That in the district or zilla gaol never more than one person be shut up in one of the present small cells.

44. That a proper hospital ward be provided for the sick.

45. That the drains be always kept clear.

46. That the high milk-bush fence of the former gaol latrine be removed.

47. That milk-bush be substituted for prickly pear as a fence to the gaol.

48. That a burial-ground for the gaol be found to the north of the city, instead of in its present situation.

To Government in the Military Department it is recommended—

49. That, in co-operation with the municipality of Sholapoor, the margin of the fort ditch beside the town be fenced, for the safety of passengers. This subject has already been under discussion.

50. That the ditch of the fort be improved, as in its present condition it is detrimental to health. To fill it up entirely, or to excavate it, so that its bottom shall always be under water, would be effectual in stopping the evil it now causes, but the expense attending either plan would be very great. It is thought that it would be sufficient for its improvement were part of it deepened, and with the excavated material were the remainder of it filled up, so that there should at no time be any partially flooded or swampy part left in its bed. As the town would benefit by the improvement of this ditch, part of the expense should be borne by the municipality.

Poona, 19 January 1865.

A. H. Leith, M. D.,
Deputy Inspector General of Hospitals,
President, Sanitary Commission.

REPORT on the Sanitary Condition of the TOWN of AHMEDNUGGUR.

(Inspected in September 1865.)

Ahmednuggur, the chief town of the collectorate of the same name, is in north latitude $19^{\circ} 6'$ and east longitude $74^{\circ} 48'$, at 126 miles from the sea, and 1,900 feet above its level, and has a mean temperature of 77° Fahr. It is on the north bank of the river Seena, near its origin, and on the main road from Poona to Aurungabad, at a distance of 70 miles from the former place, and 65 in direct line south-west by south from the latter. The country around is undulating, and is closed in on the north and east, at a distance of four to six miles, by ranges of hills 500 or 600 feet high.

The trap, which is the rock of the district, has almost exclusively quartz and agate as the contained minerals of its surface beds, close to the town and in the tract extending to the hills due east of it. In some places where the rock is disintegrated, there is concretionary lime or kunkur, which is quarried to be burnt in the kiln, for use as building mortar.

The town stands on high ground, which has a hard and, here and there, a rocky surface, and which has a gentle declivity westward to the river. It is of an irregular somewhat oval shape, enclosed with a wall about 12 feet high and three miles in circuit. The wall has its base of stone, and its upper part of clay, and it has many small round bastions, but it is of little strength. There are nine gates in use.

The surface included within the wall is nearly 368 acres. The northern or higher part of the ground is almost all fully built on, but the western and south-western parts are less occupied by houses, and there are some gardens in them.

The town is not divided into regularly defined sections, but there are several districts that are inhabited by cultivators, and that are called after the villages to which their fields belong, such are Nalegaon, Morchoodanugur, Bagrooza, and Maleewara. Other parts of the town are often called after the chief streets or alee that pass through them, while some have the designation of pooras, as Surjapooras, Kumalpooras, Atumpooras. These divisions are not used for municipal or police purposes, and are of use only to indicate localities of residence in the absence of names to many of the streets and lanes.

There are about eight miles of the streets metalled, and some of these made roads are of considerable width and length. The streets, however, are mostly unmetalled, narrow, and tortuous, or short, and although they have a general east and west and north and south direction, their crookedness prevents the free ventilation they might otherwise have from the prevailing winds.

The results of Observations on the Direction of the Wind that are said to have been made Morning and Evening during the Three Years 1862 to 1864, at the Civil Hospital, show the Number of Days that it blew from the—

	North.	N. E.	East.	S. E.	South.	S. W.	West.	N. W.
	<i>Days.</i>	<i>Days.</i>	<i>Days.</i>	<i>Days.</i>	<i>Days.</i>	<i>Days.</i>	<i>Days.</i>	<i>Days.</i>
January - -	10	97	9	16	7	28	16	127
February - -	97	35	-	19	-	28	2	189
March - - -	-	38	13	17	-	27	22	193
April - - -	12	62	2	48	5	13	5	153
May - - - -	2	55	-	21	-	5	2	225
June - - - -	3	13	-	10	-	123	29	122
July - - - -	-	-	-	3	-	109	43	155
August - - -	-	-	-	-	-	165	85	60
September - -	2	05	-	10	-	115	33	135
October - - -	23	22	22	25	-	28	9	181
November - -	5	82	-	61	7	45	8	92
December - -	20	227	3	13	5	15	2	25
Year - - - -	83	634	48	247	23	701	255	1659

There are four or five streets with shops open towards the road, but with these exceptions the houses are in square enclosures with only an entrance door in the dead wall. There are a few substantial new houses, and a very few with upper floors, but most of those that are large and were well built, are now either ruinous or falling into decay, owing to the poverty of their present owners. Some of the dilapidated buildings retain the name of palace (mahal), that they had in the time of Moosulman prosperity. Most of the houses are mean mud huts, within square enclosures of mud wall, the rooms being built against the wall and leaving a small central court. The squares vary in size, and are placed without regularity, and as there has been little or no thought of roads for convenience of intercommunication or traffic when they were built, they form blind alleys and puzzling labyrinths.

With the exception of about an eighth that are tiled, all the houses have terraced roofs, and since the roofs, as well as the walls, are of mud, they are ill fitted to stand in heavy rain. Notwithstanding the occurrence of fatal accidents from time to time through the falling-in of roofs, the people will not use tiles, from a persuasion that they are unlucky.

In the more respectable streets the houses have privies, which, however, are generally nothing else than a screened portion of the court with a roof. Sweepers are rarely regular in their visits, but are called when the accumulation of filth is great. There is generally a little drain or gutter leading from the bathing place, and often it is joined by one from the privy, to convey foul liquids to a small pit where they are in part absorbed; sometimes an earthen jar is kept in the pit, and when it is full, a sweeper carries it away to empty it, or the contents are thrown on the public road. At the time of this inspection a man was seen in open day taking out the black fetid mud that had accumulated to an inconvenient extent in the pit in his court-yard, and throwing it on the road with an indifference on his own and his neighbours' parts, that showed that he was doing nothing uncommon. These sunken jars are often in the public road, as was seen also at Sholapoor, and receive the sewage through an aperture in the wall.

Most of the made roads in the city have side gutters formed between the kerbstone and the foundation of the house, and with a rough flat bottom. In some of the streets, instead of the footpaths for passengers that there is in other towns, there are masonry benches along the walls of the houses a foot and a half or two feet high, for the owners of the houses to sit on, and the side gutter, in such cases, passes under the bench and is covered, elsewhere it is open. Where these gutters are available, the sunken jar is not used. Except when it rains, all the fluid that is received by the drains, where uncovered, is absorbed into the ground or the foundations of the houses, and even on the occurrence of rain all is not always washed away. It had rained heavily immediately before this visit to the town, yet either from imperfection in the gradients, or choking of the drains, offensively foul accumulations were seen at several places where the slabs over the covered gutters were removed. The poorer of the inhabitants, such as resided in Topkhana, and the cultivators living in Nalegaon and Murchoodanngur, resorted for the vilest purposes to deserted enclosures and even to the roads. Those districts were very unclean, as may be imagined when such practices were allowed, while there was not even one sweeper in the service of the municipality.

The fall of the surface is to a nulla on the west of the town outside the wall and to the Secna on the south, and there are three main drains to carry off the storm waters in those directions. The surface of the town is far from being efficiently drained. There are many places where after rain the water was seen to remain in pools. In the south part of the city there are several hollows, in which houses are built that are much below the level of the road, and from which the storm water has not sufficient way of escape.

The yearly rainfall, as obtained from a mean of the observations made at the civil hospital in the middle of the town, and at the police hospital outside the wall, during the eleven years 1854 to 1864, is 25·68 inches; the maximum was 38·57 in 1861, and the minimum 16·46 inches in the year 1855.

The monthly fall in the same series of years:—

	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.
Mean of 11 years	·20	·05	·19	·25	1·79	5·30	1·86	3·89	6·37	4·94	·50	·34

The greatest fall in any month in the eleven years, was 10·56 inches.

It is thus seen that usually more or less rain falls in every month of the year, and that in September the greatest amount falls, and then in diminishing order in June, October, August, July, and May. In the other months the fall does not reach an inch in quantity.

The municipality maintains an establishment with carts for removing refuse from the roads, and it has several depôts for the street sweepings or litter, which it sells for manure. Most of these depôts are within the walls; one was seen in Topkhana, and it was most evidently a place where the filth of privies was usually thrown. There was a very large depôt at Maleewara.

Between the Surjapoor gate and Bagurputta, where weavers live, there are lime-kilns in a lane close to their owners' houses.

The chief bazar is the Gunj in the middle of the city; it is a large square which has its area in great part filled with buildings. The others are in streets; they are Artia che koot where goor and ghee are sold. The Deouree Bazar for cloth; the Joona Bazar in which the shops are in houses without verandahs, and make no show. The houses in this street have but the ground floor, some have the tower-like elevation on the top, which is called Sujja at Pundhurpoor, but is here called Jeena. The Dal Mundae is

is a wide street where grain is sold by those who bring it from the surrounding country in their carts, which they range along the sides of the road.

The Mungul Mundaee is a weekly market named from the day of the week on which it is held, the market-place is a square, planted with trees, besides Khundukpoora and Niamut Khan Mahal. The ground is low, and water forms pools on it after rain.

The municipality has lately got possession of a garden, which it has made a place of public recreation. It is near the Mungul Mundaee. The sale of the vegetables and fruit produced in it defrays the expenses of maintaining it.

All the judicial, magisterial, revenue, and police offices are in the town; also the criminal and debtors' gaols, the civil hospital and dispensary, and the Government schools. Besides these there are mission schools. The official residence of the collector of the zilla is also within the wall.

The municipal limits are nearly circumscribed by the city wall; there can hardly be said to be a suburb of the town. The only dwellings that can be so considered are those of Mharwara, close outside the Maleewara gate, near to where is seen, built into the wall, the memorial tablet to the officers and men of the 78th Highlanders, who were killed in the year 1803 at the taking of the town.

There is indeed another suburb, the Mundaee, between the Bhuwa Bungala and the Jaecenda gates, which once belonged to the town, but now it is within the military cantonment that envelopes the east and half of the north of the city.

On the north of the city there are the lines of the district police, and gardens. On the west, or windward, there is a nulla to which the neighbouring inhabitants resort as to a latrine, and the strictness of the police of the cantonment on the other side seems to occasion a concentration of nuisances in this narrow ravine, that is bounded on one side by the wall, and on the other by a high prickly pear hedge that encloses the gardens lying farther west. On the bank of the river, between the point where this nulla joins it and the Neptee gate, is the burial-place. It is of small extent and when seen at this visit, the ground was swampy; it is to the windward, and close to the wall. The brick-kilns are also close to the wall and near the burial-ground. There have been no burials within the town since the year 1857, when they were summarily stopped by the magistrate.

The ground lying outside the town, near the Maleewara gate, is cultivated, and was bearing a crop of bajree.

The inhabitants are supplied with drinking water brought by underground masonry conduits from neighbouring hills, and distributed in numerous cisterns in different parts of the town. The river, from being near its sources in the hills, is subject to sudden floods of short duration, and during these it is of formidable size. In the hot months it ceases to flow. The conduits never fail, although the quantity they convey becomes scanty at the end of the hot season. Wells afford but brackish water, not only in the town, as might be expected, but in the immediately surrounding country.

Ahmednuggur and its fort and its suburbs were formerly more abundantly provided with water than now. Seven aqueducts contributed the supply from various directions, and from distances of from four to six miles. They were the Kapoorwara, the Wurgaon, and the Nimbgaon for the city, the Shapoor and the Nazabye to the fort, and Bhingar and Shendee to the Furia and Bihist Bagh. The Shapoor aqueduct is now being restored for the use of the cantonment. The Bhingar conduit still flows, and it supplies the European troops. The Kapoorwara and the Wurgaon aqueducts are the only others besides the Bhingar that remain unchoked. A survey and estimate for the repair of the Nimbgaon conduit are being made for the municipality. The Kapoorwara aqueduct, after giving water in the lines of the native infantry regiment in the cantonment, supplies seven cisterns in the town. The Wurgaon Nul, besides supplying the two gaols, gives water to 23 cisterns, either public ones, or private ones, to which the public are allowed free access. The cisterns most recently constructed by the municipality are two for Mhangs and two for Mhars, near the Delhi and Topkhana gates.

The number of houses has lately been accurately ascertained, and each has its number painted on it; they amount to 5,398, of which 109 are Government buildings, dhurmsala, musjeed, and temples. Of the others 4,096 are occupied by Hindoos, 1,152 by Moosulmans, and 41 by other races. This will give a population of nearly 31,734, if it be assumed that a family may be reckoned at six persons. That number would have only 56 square yards each of standing ground, but the little height to which the houses are raised, and the supply there is of good water, tend to mitigate in some measure the many disadvantages to which, as the preceding description renders it apparent, the inhabitants are exposed.

There has been a municipal commission since 1855, and it is now guided by the rules that are in general use with municipalities in this Presidency.

The revenue up to this time has been obtained by octroi levied on grain, cloth, and groceries, and the sale of street sweepings and litter. Last year it amounted to 7,000 rupees. Now the octroi has ceased, and a tax is to be levied on each house at a rate varying from 8 annas to 8 rupees a year. It is expected that between 10,000 and 11,000 rupees will be obtained by this tax.

RECOMMENDATIONS.

The municipal income has increased considerably in the last two or three years, but still it is small for the population when compared with the revenue of some other towns, and it is insufficient to defray the expense of carrying out, so rapidly as is to be desired, the improvements that are required. Other towns of the same or smaller size have a medical dispensary supported at least in part by the inhabitants, while Ahmednuggur contributes nothing to relieve the sickness of its poor, nor does it, as some municipalities do, employ a vaccinator. The vaccinator, at least, the town might support, while its works of sanitary improvement were being carried on, if the people were to agree to give as largely as some others do elsewhere.

Even were the octroi continued with the house tax, the burden would be but light, only about 9 annas a person, while there are towns that contribute at the average rate of a rupee.

1. I would recommend that the octroi should be again had recourse to, unless some better way of raising the revenue be devised. Also that the minor sources of income, such as a tax on bands of music, should not be neglected.

2. That a place outside the wall be found where the filth of the town may be deposited.

Owing to the town being circumscribed as it is, by the cantonment and the river and valuable garden ground, it is impossible to arrange in a perfectly satisfactory way for the filth depôts. Taking into account the direction of the prevailing winds, it is thought that the best spot is that which lies between the road to Poona and the river south south-west of the Maleewara gate.

3. That public latrines for males and also for females be erected between the Maleewara gate and the river; and also outside of the Topkhana gate for the convenience of those residing in the north end of the town.

4. That the walls of ruined huts and of deserted enclosures be removed, so that they may not give shelter to nuisances; and that the material be used in filling hollows and excavations.

5. That sweepers, with tank carts to receive night soil, be employed in different districts, and that they make regular rounds.

As this class of servants is but small, it would be an economical arrangement if the municipality were to organize and manage an establishment that would do the sweepers' work for the houses of all who would contribute to the fund kept for the purpose. By combination in this way the expense would be lessened, and many would be able to have the service that is so needful to health and comfort, but which is very expensive when arranged for by individual householders.

All-absorbent cesspits should be at once prohibited. The filth carts would provide the means of disposing of foul liquid refuse.

7. The discharging of the drainage of privies into the side gutters should be prohibited.

8. These gutters should be improved by lining them with stone to prevent their contents soaking into the foundations of the houses.

A simple gutter might be made by placing a stone slab in a sloping position, so that it would defend the wall of the house, and by joining the under edge of the kerbstone, would form a channel of which the section would be like a V.

9. When permission is given to build or rebuild a house, it should be required that a privy on a satisfactory plan be provided; the floor of the privy should in every case be paved with stone.

10. When leave is given to the poorer inhabitants to build huts, the ground should be marked out for them, so as to secure their being in line and having sufficient streets for ventilation and for thoroughfare.

The people should be induced to use tiles for roofing, as the interstices of a tiled roof secure a little ventilation, whereas with a terraced roof there will be none when the door is shut. The terraced roof of clay is, from experience, found to be unsafe in rainy weather.

11. The inclosing the huts in quadrangular courts is unwholesome, from its preventing ventilation, and should be discouraged.

12. When being at the expense of making permanent metalled roadways, every effort should be made to widen and make straight the now crooked and narrow lanes.

13. The Hindoo burial-place should be removed from its present situation at the windward of the town.

14. The-brick kiln should be removed from its windward position.

15. When

15. When the arrangements that have been recommended have been carried out, the nulla to the west of the town need no longer be offensive, and the town wall may then be removed on the west and south sides, with great advantage to health, for the admission of the westerly breezes. At present its removal on that side is not to be recommended, as it shuts out, in some degree, the exhalations from the very foul ravine.

It is not thought that it would be expedient to remove the eastern part of the wall, which now forms a boundary between the cantonment and the town.

16. The lime burners should not be allowed to carry on their trade within the wall.

17. The streets and lanes should all be named.

18. It is well that the town is provided with water at all seasons, and that great privation from scantiness of the supply is not known. Yet it remains to be desired that not only should the inhabitants have abundance at all seasons to drink, but that they should also have a supply to enable all to enjoy the healthfulness and comfort of cleanliness. The desire that is manifested by the municipal commission to increase the present supply, should act as an incentive to increase the pecuniary means of effecting it.

In determining which aqueduct should be restored, it should be borne in mind that more general advantage would be derived from a delivery at the high north end of the city than at the lower level of the west or south ends.

Whether, in this view, the Nimbgaon, Neptee, or the Shendee, or the Nazabye conduit should have the preference, can only be determined after a survey of the courses of those aqueducts has been made.

A. H. Leith.

REPORT on the VILLAGE of BHINGAR.

(Inspected on 21 September 1865.)

PRESENT:

A. H. Leith, M. D., President.

Colonel H. W. B. Bell, Royal Engineers, Member.

Surgeon T. B. Beatty, M. D., Member and Secretary.

WITH reference to Government Resolution, No. 2030 of 1865, and accompaniments of Memorandum of 3rd September 1865, relative to the dangerous proximity of Bhingar to the European cavalry and artillery barracks at Ahmednuggur, it was considered necessary that the Sanitary Commission should visit Ahmednuggur and personally examine the village of Bhingar and obtain such further information regarding it as might be available.

This visit has been made, and I have the honour to submit to his Excellency the Governor in Council the recommendations that have been judged necessary after viewing the place and considering the documents before the commission.

Bhingar, which is on the side of a large nulla that flows westward through the cantonment, lies close to the lines that marks the military limits. It is about eleven furlongs to the eastward of the native infantry lines and the city, which are close together. It is half a mile to the north-eastward of the nearest part of the barracks occupied by the European cavalry and artillery, and three furlongs from their married men's quarters; but it is nearly continuous with the Sudur Bazar, that almost fills up the interval between those quarters and the village. The European cavalry and artillery barracks are a mile to the southward of the city and the Native infantry lines.

Bhingar has for a long while been complained of by the medical officers of the brigade and by the military authorities on account of its filthiness and its affording shelter to prostitutes and others of bad character, to the hurt of the troops. In the correspondence now under reference, it is particularly stated that the village is the source from which cholera is communicated to the cantonment.

That Bhingar is a place where cholera is fostered is probably true, but at the time of the epidemic prevalence of the disease in 1862, the Deputy Inspector General of Hospitals of the division, in his letter, No. 700 of 1862, in continuation of a report on the occurrences of cholera during the preceding 10 years, stated, after particular inquiries on the subject having been made, that there was "no information to be obtained relative to the priority of the attacks of cholera in the village or cantonment."

The course of the epidemic this year has been investigated, and from the returns obtained from all known available sources, it is seen that cholera was prevalent in the city and also in the cantonment bazar in April and the beginning of May, and that in the middle of May, which was the time of its increase in the artillery and cavalry lines, there was a simultaneous exacerbation of the disease in the city and in the Native infantry

depôt, a mile distant, as well as in the Sudur Bazar, close to the European married men's quarters. The official report of the mortality in Bhingar, which is almost continuous with the Sudur Bazar, states that there were no cholera deaths in the village until the 17th May, when 15 were recorded. Whether this record is absolutely correct or not so, cannot now be ascertained, but as the invasion of cholera usually begins with one or two cases, followed a day or two later by a greater number, the sudden occurrence of 15 deaths gives room to question the accuracy of the report. If the returns were correct, the inference would be, that the Sudur Bazar was the centre from which cholera radiated to Bhingar as well as to the European barracks.

The opinion that in letter No. 289 of 1865, from the major general commanding the division, is attributed to Brigadier General Birdwood, that all the cholera at Ahmednuggur "commenced at Bhingar, and that it is owing to this filthy place being so near to camp that the troops in camp are so often visited by it" may be correct, although the existing records do not substantiate it. It has been observed that filthy localities are liable to suffer severely when the disease is prevalent, and evidence of this was seen in the lines of the dépôt of the 22nd Native Infantry during presence of cholera at Ahmednuggur this year.

There is no room to doubt that Bhingar is a filthy village; and it is indubitable that the close vicinity of a place so foul and so badly regulated as it is stated to be, is objectionable as regards health, and must be detrimental to the soldiers who have communication with it in a moral as well as a physical point of view.

The Sanitary Commission inspected the village on the 21st September, in company with the brigadier general and his staff, and the collector and magistrate of the zillah.

There was a considerable extent of metalled roads, which were found cleanly swept. These roads had side gutters, but they were in some places filled up with the accumulated mud, and in others foul water was stagnant. Excepting the bazars, where the houses were in line, the village was built most irregularly. Although there were some substantial houses, it chiefly consisted of square inclosures of various extent, with mud walls five or six feet and upwards in height. Among these there were narrow crooked lanes and blind alleys; and they, and the many ruins that existed, were seen to be receptacles of filth, and to be resorted to as latrines. There were several deposits of sweepings in the village that were said to have been stored there for sale, although the prospect of gain to the municipality from this source could be but small. Were the place of deposit away from the village, the filth would find as ready a market, while the impurity of the air breathed by the inhabitants would be lessened. There was a very large heap of foul sweepings stored as fuel at a brick kiln, which most objectionably adjoined the village on its east side. The fields or gardens which lie close to the north side of the village are enclosed with gigantic prickly pear hedges, which give cover to filth and impede ventilation. There are no public necessities for the poor; and many of the inhabitants resort to the sides of a small hill that rises close to the east side of the village. Many of the poorer of the population of the Sudur Bazar are driven by the stringency of the cantonment rules, and the activity of its police, to add to the defilement of the neighbourhood of Bhingar, which the military at the same time say truly is most offensively foul. The cantonment native latrine that is nearest to the Sudur Bazar, is that which is used by the store Lascars, and, as it is a mile distant, it is of no use to the people of the bazar. At the south-east, but close to the village, there is a tannery.

Bhingar is supplied with good drinking water, brought by underground conduit from the hills a few miles distant.

The value of the land and houses of Bhingar has been estimated to be 4,01,715 rupees, yet the net revenue of the municipality for last year was only Rs. 747. 7. 10. The revenue is from a house tax varying from two annas to two rupees and a quarter on each house. In the year 1860-61 Government gave a grant of 400 rupees to make side gutters to the streets.

It has been proposed to relieve the cantonment of the present evils attendant on the neighbourhood of Bhingar, either by clearing it away, or by bringing it within cantonment limits and military rule.

For the reasons shown in the documents to which the Commission has been afforded access, it appears that both propositions are impracticable.

With a view to improve the sanitary condition of Bhingar, the municipality should be required—

1. To provide public latrines for men and for women; the first set to be on the rocky ground east of the village and north of the hill on the summit of which the old tomb stands. The latrine of Macfarlane, modified for Native use, and made to discharge into a tank cart, would be the best for the purpose. The soil should be removed to the fields south-eastward. Other latrines, north-east of the village, should subsequently be provided.

2. To provide and maintain a cart to collect the street sweepings daily, and to carry them from the village to a distant place of deposit in an easterly direction.

3. Then to inflict penalties on those committing nuisances within and around the village.

4. To

4. To remove the brick kiln to a spot as far to the eastward as possible.
5. To remove the tannery also in the same direction, to as great a distance as the village ground will admit of.
6. To exercise due control over the tannery, so as to diminish the nuisance which such a work place always occasions.
7. To remove the walls of all deserted inclosures and unoccupied ruinous houses, that they may no longer give cover to filth; and to fill up excavations in which pools form in the rains.
8. To permit the building or rebuilding of houses only when the approval of the municipality has been obtained.
9. To improve every opportunity that can be found for making straight and wide streets.
10. To remove the prickly pear fences in the neighbourhood of the village.
11. To devise ways of raising a yearly revenue adequate to provide the appliances and establishment necessary to keep the village clean and to carry out improvements in it.

Past experience has shown, that while without a constant magisterial supervision, cleanliness and order have not been maintained, and that in order to bring Bhingar into a condition that will be favourable to its own inhabitants, and will not endanger the health of the adjoining cantonment, it is desirable that it should have an European magistrate.

Although the law which can be applied for the suppression of nuisances in places out of military limits is less summarily efficacious than that which is at present in force in cantonments, yet great improvement in the condition of Bhingar might be effected were the law of the district stringently and steadily applied. This the collector says cannot be done by the assistant magistrate now in charge, because his presence is required elsewhere during a great part of the year. The magistrate of the collectorate has suggested that the cantonment magistrate, who already has the legal qualification, should be put in charge of Bhingar as a district in addition to his present cantonment duties. The brigadier general has agreed to this arrangement if it meets with the approval of Government. The cantonment magistrate would, by the existing law, thus be enabled to abate nuisances in Bhingar, to search for concealed liquor and prevent its illegal sale, and to exact security for the good behaviour of suspected persons. Owing to the necessity there would be for his conforming to the procedure of the district courts, he would have a considerable addition to his office work, and provision would require to be made for that.

The Sanitary Commission respectfully recommends to Government—

12. That the cantonment magistrate be put in charge of Bhingar, with such pecuniary allowance as his increased office duties may be thought to require.
13. As the present funds of the municipality are altogether inadequate to effect the improvements that are urgently needed, not only for the welfare of the village inhabitants, but for that of the neighbouring cantonment, the Commission suggests that the expense of at once clearing away all existing ruins and walls of unoccupied inclosures should be borne by Government. Also that the first latrines be provided by Government.
14. That latrines be provided to the eastward of the Sudur Bazar for those of its inhabitants who have no private conveniences, and who now are driven to defile the ground about Bhingar and elsewhere. The latrines should be of the kind recommended for that village.
15. That the further extension of the Sudur Bazar be prohibited.
16. That the isolation and the diminution of that bazar be persistently carried out by clearing away ruined and abandoned huts, and keeping the ground on which they stood unoccupied.

The distance of Bhingar from the European barracks is half a mile, and this distance would scarcely be sufficient to give the soldiers immunity from danger from a place liable to be so foul as it now is, even were the interval clear and unoccupied, but here, as in other instances that have lately been brought to the notice of Government, the Cantonment Bazar has been placed, most objectionably, between the barracks and the village, and has been allowed to extend so as nearly to efface the interval, by the location of a population now amounting to about 3,000, a number out of due proportion to so small a force. A great part of the bazar population has no necessary connection with the troops, and its presence is hurtful from increasing the liability to such diseases as are developed in densely congregated masses of men. The returns which have been quoted show that cholera was harboured in the Sudur Bazar for several weeks before it appeared in the barracks.

REPORT on the SANITARY CONDITION of PUNDHURPOOR.

(Inspected in January 1865.)

THE town of Pundhurpoor has importance, in a sanitary point of view, far beyond what the amount of its resident population could give it. It calls for attention on account of the vast numbers that flock to it at all times under circumstances that favour the generation of disease, and who, in again returning to their homes, scatter that disease in an epidemic form throughout the country.

The attraction at Pundhurpoor is the idol Vitoba, believed by the people to be an incarnation of Vishnoo that appeared at this place, and who in their legends is variously named Moorleedhur, Gopal, Vitul, and Krishna. This idol is the chief object of worship among the Murathas, and people of all castes visit it, and for many years pilgrims have come from far to see it. Now the speed and ease with which the journey can be made by railway has greatly increased the flow of devotees to Pundhurpoor, and many come even from Goozerat, and as the journey from Bombay and back, that in former days occupied a month or more, can now be performed with the aid of the railway in three or four days, there are many, both rich and poor, who perform it.

It is thought to be a meritorious thing to visit the idol at any time, but there are days on which the worship is considered to be of more than usual virtue. The Hindoos, who observe lunar time, divide the month into two parts, and number 14 days from the new moon, and again begin from full moon to count another period of 14 days. In each month there are two days devoted to Vitoba, the one is the 11th from the new moon, and the other the 11th from the full moon, and on those days the villagers within a distance of 10 or 12 miles come to Pundhurpoor to worship. There are two months in the year in which these 11th days are more pre-eminently sacred, and in which the pilgrims come from greater distances, and the religious observances in these months last for a fortnight, or from the 11th of the waxing to the 11th of waning moon. These months are Ashar, which falls partly or wholly in July, and Kartik, that falls partly or wholly in October.

My inspection of the town was in January, and I arrived on the morning after the ekadusee (11th). Many of the pilgrims had already departed, but there still were numerous groups of them studding the gravelly bed of the river for an extent of about two miles, or from the bend about half a mile above the town, to the Pondalik and the other temples that are in the river bed below the town. Most seemed to have lain under the sole canopy of the sky, while others had sheltered themselves with a (pal or) tent made of a sheet or blanket stretched over poles. Some were bathing or washing their clothes in the stream, others were eating or cooking their food, while many were preparing their ponies and pack-bullocks for their return home with their wives and children, who had been the companions of their pilgrimage. There was no place of privacy, and persons were seen openly defiling the bed of the river.

Pundhurpoor, in latitude $17^{\circ} 41'$, longitude $75^{\circ} 24'$, has lately been transferred from the Satara collectorate to the Sholapoor sub-collectorate of the Poona Zilla. It is 110 miles from Satara, 38 from Sholapoor, 157 miles from Ahmednuggur, and 119 miles from Poona, at all of which places there are military cantonments. From the last-mentioned station it may now be reached in a day, as the railroad passes, at Mohol, within about 24 miles of it.

There are no hills near, and the country around has a gently undulating surface, and is under cultivation. The town stands by the right bank of the Bheema river, which is here called the Chundrabhaga.

The river is serpentine, but where it passes the town its course is southward. The channel of the river is 330 yards wide, but it is only during part of the rainy season that it is full; and the ferry boat that plies on it is not required after November or the beginning of December. In January the stream was found to occupy only about a sixth of the channel, and it was easily fordable. The ford is, unfortunately, above the town.

The township land is cultivated, either as fields or gardens, close up to the town, and it is bounded at about three-quarters of a mile north, and in the direction of the village of Isbawee, by a watercourse, the Wundeecha-cha Ora, in which there is a little water nearly all the year, and on the south, at the same distance, it is bounded by a much larger watercourse, over which the Beejapoor Road crosses by a bridge at Gopalpoor.

Gopalpoor is beyond the township limit on the south bank of the ora or watercourse; it is now an utterly deserted village, but with many of its houses still standing, although in a ruinous condition. The site is rocky, and is much higher than that of Pundhurpoor. The temple of Kala Gopal stands on the highest part of the ground, and is in good repair, and it is obligatory for the pilgrims at the great Jutra to visit it.

The cultivated ground beside the town is of black soil, excepting on the south, where, near the Gopalpoor bridge, there are some fields of a red sandy earth. On the west, beginning at the Pudmawuttee temple, about half a mile distant, there is a slightly elevated ridge of amygdaloidal trap and its gravel that extends for some distance along the Kasegaon road.

There is no lengthened series of accurate meteorological observations; all that is available

available is the register of the rainfall of the south-west monsoon kept at the office of the native revenue officer, the mamlutdar, and the results of observations during a complete year of the thermometer and the general direction of the wind, kept at the Charitable Dispensary. Rain may or may not have fallen in any of the months from December to May: it is not noted.

Monsoon Rainfall in Five Years.

YEARS.	June.	July.	August.	Sept.	October.	Nov.	TOTAL.
1860 - - - -	12.12	1.91	1.60	7.76	1.26	-	24.65
1861 - - - -	3.16	2.23	10.27	3.83	1.42	-	20.91
1862 - - - -	5.20	0.56	1.98	14.66	6.74	0.61	29.39
1863 - - - -	2.50	4.68	3.48	3.87	2.54	-	16.62
1864 - - - -	7.11	1.34	6.30	5.44	-	-	20.19
Mean - - -	5.49	2.14	4.73	7.11	2.39	0.12	22.35

The Monthly Temperature noted during the Year 1864 was by Fahr. Thermometer.

	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Year.
Mean - - - -	68	73	83	82	90	86	80	80	79	80	79	72	79
Maximum - - - -	74	76	90	96	96	90	83	83	82	81	82	76	96
Minimum - - - -	64	66	69	76	83	81	77	78	75	77	73	66	64

There was no gauge to aid in determining the direction of the wind, and the following results of the observations made cannot claim to be a very close approximation to the truth:—

Prevailing Direction of the Wind, Morning and Evening, during 1864.

	Jan.	Feb.	March.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Morning	E.	W.	W.	N. E.	W.	S. W.	S. W.	S. W.	W.	S. E.	S. E.	W.
Evening	W.	S. E.	S. W.	W.	S. W.	S. W.	S. W.	S. W.	N. W.	S. W.	S. E.	W.

The town is not walled, but it is well defined in outline, and is closely built, except at its north end, beside the Satara Road, where the ground is not fully occupied.

It is likely that the nucleus of Pundhurpoor was built on surface rock or gravel similar to what is seen at a little distance to the west, as such is met with in wells. A great portion of the site of the present town is black soil. The central part of the town, which is somewhat more elevated than the rest, is on an eminence formed of the accumulated ruins of former houses. This was seen in a deep foundation that was being dug near the tirthee gate of the Temple of Vitoba, where the section showed the rubbish of old buildings; and there is now a descent of nine steps of more than ordinary depth to the court of the temple, which, from being paved and being constantly swept, has maintained its original level, while the surrounding ground has in the course of time grown in height. An inhabitant told me that he had seen a long forgotten temple uncovered in digging the foundation of a house.

Pundhurpoor occupies a belt of about two and a half furlongs broad and about a mile and a half long on the bank of the river. The streets, or as they may more appropriately be called, lanes and alleys, are numerous, irregular in direction, crooked, and narrow, most of them being only six or eight feet wide, and some were ascertained to be so narrow as three feet. They are mostly paved with stone, and almost all have a central covered drain. The stones are worn smooth and slippery, and afford very unsafe footing for horses, but the pavement is most excellent as regards health, and far preferable, under

the circumstances of the town, where the distances are so short, to macadamized roads, into which the abundant filth would soak, and be a source of hurtful exhalations. The stone prevents imbibition, and keeps the filth on the surface until cleared away by scavengers, or until it is at least so desiccated as to be comparatively but little hurtful.

There are some newly made macadamized roads with open side-gutters; these are wide enough for carts to pass, which is an advantage they have over the old lanes.

These new roads are undoubtedly useful, but it is not desirable that the macadamizing should become general. The chief of the metalled roads is one which passes round the town, including in its circle all the 12 temples, and is intended to make easy the performance of the ceremony of *purdukshun*, or circumambulation of the whole together, which is obligatory on pilgrims. The streets occupied by shops are also metalled, and wider than the generality of the lanes.

The houses on the western and northern outskirts of the town are mere mud huts in filthy enclosures. The middle of the town is more substantially built, and many of the houses are on plinths about two feet high, and have at least the lower 10 or 12 feet of their walls of cut stone or burnt brick and lime mortar; above that height most of them have less substantial material. They generally have one or two upper stories, and some have three, and all have terraced roofs. Nearly all are in dead-wall enclosures, without side windows or any opening to the street, excepting the door. The houses in the bazars are differently constructed, and have windows with wooden shutters but no glazed case-ments. Excepting in the bazar streets, the houses have a general similarity in arrangement. The street door gives entrance to a paved room, in which any cattle the family may have are kept, and in a corner of which the house privy, if there is one, is placed; the place is dark and offensive. The visitor is then led up a narrow stair to the upper rooms, which are small and low and badly lighted by means of a central shaft, called the *chouk*, that passes upwards from the foul ground-floor, and is from four to eight feet square, and is open to the sky at all seasons. The rooms on the different floors in the larger houses are arranged round the *chouk* like galleries, to benefit by its light. In the smaller houses it serves also the purpose of a chimney. The roof water falls through this shaft to the basement pavement, from which it passes by the house drain into the street sewer. The terraced roof is generally of clay, which is said to be sufficient to resist the rain, which falls lightly here. Besides the opening of the central shaft, many houses have small chimneys from the cooking-room rising through the roof. There is often a little turret, called *sujja*, eight or ten feet high, on the roof, and large enough at the top for one or two persons to sit and enjoy the cool breeze.

In the older parts of the town the privies as well as the bathing-places are drained into the street sewers, but the drains are mostly choked, and it is said the greater part of the inhabitants do not use privies. The total number of sweepers in Pundhurpoor is 15, and of these two are in the service of the municipality; this number is altogether unequal to the task of keeping the houses clean. In the metalled streets liquid refuse is drained into the open, badly made, side-gutters, there to be absorbed, or to evaporate if it be the dry season. Those who live near the side of the town resort to open spaces and to the fields, while those in the centre of the town, who have no convenience in their houses, frequent the public lanes and alleys, which in the morning are nearly unpassable to a stranger. As the day advances, however, they are cleaned by the pigs, which are seen here in almost incredible numbers. The municipality has gone to considerable expense in building a public latrine of a hundred seats, but it is not on a good plan, and as it is to the west or windward of the middle of the town, it is likely, if finished and used, to be the occasion of worse nuisance than even the present practices of the inhabitants. The numerous street sewers lead into six main drains that have their outlets at the river-side close to as many of the eight ghat, or flights of steps, leading down to its bed. It is in the rains only, when there is abundance of water, that these drains flow, and even then they now flow imperfectly, as they have not been cleared, it is said, for the last six years.

The Chundrabhaga is almost the sole source from which drinking water is taken. During the rains, when the river is flooded, the water is muddy, and requires subsidence to clear it: filtering is never practised here. After the rains have ceased, the stream is naturally clear, and would afford a wholesome supply if it were undefiled, but as there is no restraint whatever exercised, both the resident population and the pilgrims bathe and wash in it, and they and their cattle otherwise defile it. When it is low, for several months before the rains, it is described as being most impure.

There are two public wells, the gift of charitable persons, but one only of them gives drinkable water. Among about 15 private wells there are five that give good water and to which the public are allowed access; three of these are outside the south end of the town near the Moosulman burial-ground, one opposite the middle of the town, near the temple of Vitoba, and another is at the north end, on the Ishawee road. The Pudmawuttee Tulao is the only tank, and it being in porous rock in an elevated situation, does not retain water after the rains.

According to the census of 1851, there were 2,100 houses and 14,000 resident inhabitants, or $6\frac{2}{3}$ to a house. There is no sign of there having been any considerable increase in the number of houses since that time. There is a large proportion of Brahmans in the town, the Budwae families alone being estimated at about 1,000 persons. The numerous temples bring support to that caste.

There are 500 shops, by far the greater number being for the sale of food and condiments to the inhabitants and sojourners, which latter are estimated at about 4,000 or 5,000

5,000 at ordinary times, when there is no Jutra. It is most creditable that there is only one distillery and liquor shop, and but one ganja and one opium shop. There are persons carrying on all the trades required to meet the ordinary daily wants of the people. There are four brick-kilns and potteries, and ten lime-kilns. The only article that is produced here for external trade is kuree, or silk articles of dress stamped with gilt flowers and other patterns.

The pilgrim population fluctuates greatly according to the time of the month and of the year. The influx at the ordinary 11ths of the moon is estimated to be from 8,000 to 10,000, and at the Jutra, in the months of Ashar and Kartik, it is variously guessed to be from 50,000 to 100,000.

In the rains, when the river is high, the pilgrims have to find lodging or a place in the town in which to put up their pal; then especially, but at all seasons also, there is great overcrowding of the people. There are many Muth or temples with attached sheds, usually in quadrangular form, for the accommodation of strangers, and the municipality has since its incorporation in 1855 built six Dhurumsalas. Those places of shelter are useful to the strangers daily arriving, but they can give accommodation to only a very small portion of those that come at the great periodical concourse.

The Budwae Brahmins, who inherit the revenue of the temple of Vitoba, increase their income by receiving lodgers of different castes into their houses, and at the great Jutra there is, from what has been learnt, great overcrowding and neglect of even ordinary cleanliness in their premises. They also hire out pal (or tents) to their constituents, for it is expected that a person who has once been a lodger with a Budwa will return to the same Budwa at all subsequent visits, and that all the members of his family will also do so. A register is kept of the lodgers and of the amount each presents to the idol, and when a pilgrim is short of money, and unable to give what is considered would be enough, he is entered in the book as debtor, and the debt is in due time recovered, either at a subsequent pilgrimage or by the Budwa coming to his village to receive it. From this it may be seen that it is to the pecuniary interest of these proprietors that the present unwholesome crowding of the town should not be interfered with.

In this small town there are 12 Hindoo temples, nearly all of which are large and expensively built, and have their numerous votaries. But the devotion to the idol Vitoba is so great, and attracts so great a number of worshippers, that all other temples than his are rendered comparatively insignificant. Vitoba's temple is in the middle of the town, and its premises, of considerable extent, are surrounded by high walls of cut stone, and beyond them by dwelling-houses.

The premises consist of two courts, the eastern, which is called the Subha Mundup, or place of meeting, is 150 feet long and 50 broad. Its paved court is comparatively but little encumbered, having only two small temples to Kala Marootee and Garood, and a peepul tree and a toolsee plant. It is quadrangular, and has on two sides a corridor about 15 feet wide, which was formerly open to all visitors, but which is now in parts partitioned. At the east end of Subha Mundup a colonnade intervenes between it and the eastern court. This eastern court would in any but a Hindoo country have some claim to be considered a Pantheon, as it has, besides the sacred peepul tree, 25 different idols, and two of these have each two temples.

The temples of Vitoba and Mahaluxmee stand in the middle of the court, and that of Rookmaee in a corner, while those of the other idols are in the corridors.

The chambers of the temple are called Gabhara, and those of Vitoba consist first of the idol chamber, in a pyramidal structure of modern Hindoo architecture. Its dimensions are 8 × 8 feet, and it has a domed roof about 30 feet high. The only openings besides the doorway are the pipe that carries the washings of the idol from the floor to a stone cistern outside, from which the devotees drink the foul liquid; the next is an opening 6½ inches in diameter in the western wall, behind the idol, about eight feet from the floor; and on each side, at the same height, there is a hole scarcely four inches square. The stone image of Vitoba stands in the middle, and between it and the door there is a horizontal bar. Two lamps give light. The door is 5 × 2½ feet.

The immediate ante-chamber into which the door of the idol's room opens is 8½ × 5½ feet and is 11½ feet high. In its roof there is a ventilating opening about five inches square, the sides of which are blackened by the smoke of the lamps above-mentioned. The eastern door of this room is 5½ × 2½ feet, and it opens into the second ante-room called the Chaokambh, from the four pillars that support the roof. There is a door in its south side 4 × 2 feet, and opposite, in the north wall, there is a slab about 18 inches square with perforations. In the terraced roof there are four ventilating openings, each two feet square, and another 8 × 4 inches. By the perforated slab and these ventilating openings alone is light admitted when the plank door is shut. At its eastern side this room communicates with the third ante-chamber, called Solkambh, from the 16 pillars supporting its roof. The Solkambh is 40½ feet long, 35½ feet broad, and 10½ feet high. Its western door opens into the colonnade of the Subha Mundup, and is the common entrance except at Jutra time. On the south there are two doors, and on the north three, and in the walls there are respectively three and two perforated slabs. The flat roofs of these rooms are continuous, and they have parapets.

There are the remains of frames of windsails that were erected over the ventilators some years since, with a view to throw down a current of air when the rooms were crowded.

A member of the temple committee stated that in former years the worshippers were admitted at Jutra, as well as other times, by the Namdeo gate of the Subha Mundup, and that

that, to prevent the delay and consequent crushing that the worship called *Spurshun* occasions, it was ordered by royal authority that *Durshun* only, that is, obeisance at a distance, should be performed. *Spurshun* to *Vitoba* requires that the worshipper having made his *Oolnaee*, or wave offering, should touch with his hand the idol's foot, and then with his arms embrace the image. The crushing that takes place among the pilgrims in forcing their way through the crowd to the narrow entrance doors, and again in striving against it to get out, is very great, as there is no proper restriction to the numbers admitted at a time. It is said to be on record that, owing to robberies taking place in the crowd, it was ordered in 1849 by the resident at *Satara*, that a police should be maintained by the temple to ensure safety to the visitors.

It is said also to be on record, that in August 1848, in consequence of deaths from crushing in the *Gabhara*, an order was issued from *Satara* to regulate the doors by which the pilgrims should enter and go out. And in November 1856, the *Mamlutdar* having reported deaths from crushing, the authority at *Satara* gave orders that the doorways should be enlarged, and that a few only should be admitted at a time.

At the *Jutra*, the *Budwae*, in order to prevent anyone passing in and out without having an opportunity of making the *dukshina*, or free-will offering, which is their perquisite, shut the usual entrance by the spacious *Subha Mundup*, and every other door except the *Tirthee Gate*, at the south-east corner. The doors of the *Gabhara* of *Vitoba's* temple are closed, and entrance is allowed only at the south door of the *Chaokambh*, or second ante-chamber, where one or more of the *Budwae* stand inside to give preference to those whose offerings are most worthy; and, in keeping out the others who try to press in, the knotted handkerchief is so freely used that the phrase "*toba chulta*" is commonly used to convey the information that the door is being opened for the worshippers. The "*toba*" is a handkerchief twisted hard like a rope, and wetted to give it weight. The inner doors are in like manner guarded by the *Budwae*, who have much arduous work in this way of realising their revenue. The door by which the worshipper is allowed to go out of the *Gabhara* is the most eastern one on the north side of the *Solkambh* room. The reason given for this arrangement is, that after having worshipped *Vitoba*, the pilgrim has to make his offering at the temple of *Rookmaee*, his wife, which is at the north-eastern corner of the court.

Before entering the *Gabhara*, the pilgrims who have entered the court by the *Tirthee Gate*, and who are said to amount to several thousands, are crowded in the narrow space about the temple of *Mahaluxmee* and between it and that of *Vitoba*, the total free area being only 449 square yards. Here the people have to stand or sit packed close together for many hours, some, the poor and the feeble, who are unable to force their way, may remain from morning to night fasting from obligation, or having eaten earth-nuts only, thirsty, heated, and fatigued by the struggle, and breathing an atmosphere polluted by the crowd, and by the filthiness naturally resulting from the long confinement of so many people unable to retire when requiring to do so. There are policemen on duty at the outside of the entrance door of the *Gabhara*, with instructions to let a few only enter at a time. From what I have learnt, the present arrangement is very ineffectual in preventing crowding inside the temple, where the police are not allowed to exercise authority. About 20, it is said, are allowed to enter at each time the *Budwa* inside opens the door; but the policeman does not know how many still remain in the temple, as exit is by a door on the other side. I have been informed by those who have full opportunities of knowing, and who have themselves passed through the ordeal of the "*toba*" and the crowd, that the crushing is so great that there is not room to move one's arms, and that the air is suffocating. The clothes are wet with perspiration, and by the time the idol chamber is reached, the devotees are bewildered and nearly unconscious, and so dazzled by the light there, after the darkness they have been in, that they can scarcely understand the instructions of the *poojaree* to present their offering. The lights are said to burn dimly, and not unfrequently to go out, and the native medical officer in charge of the dispensary informed me, that on holding a lighted torch over the ventilating opening of the first ante-chamber, he found it would not burn. When on the terraced roof of the *Chaokambh* room, at a time when only the ordinary daily numbers that frequent the temple were in it, and when the doors were not closed, as they are at the *Jutra*, the foul air that ascended through the ventilator was very offensive. The inner walls of the rooms become damp with the moisture exhaled by the crowd, and the idol also becomes wet, and the priest then says the god is fatigued.

After passing through the temple in the way that has just been related, the exhausted pilgrim returns, if he be rich enough, to a crowded lodging in the town, or to a tent, and if he be poor, he lies down without other shelter than his blanket or sheet, in the damp air of the river-bed, having drunk of its water that has been recklessly polluted. Owing to the fast, he cannot take cooked food, and out of the list of articles allowed to be eaten on the 11th of the moon, especially at *Jutra* time, the "*bhooee-moong*" (earth-nut) is what is most easily obtained, and of that he generally takes. He is thus greatly predisposed to sickness, and cholera, if present, finds a ready victim.

It has for many years been noticed that cholera frequently appears with virulence at the *Pundhurpoor* pilgrimage, and that it is subsequently spread over the country. Whether it be that the germs of the disease have, until the outbreak, been lying latent in the town, or whether they have been gathered to this focus by the many pilgrims converging to it from all quarters, is not known; but it is manifest that the seeds of the disease could scarcely find more favourable circumstances for their rapid development than they meet with at this place. The poison here concentrated acquires great intensity, and destroys many

many on the spot, while it is disseminated to towns and villages, near and far off, by the returning survivors of the pilgrims. The city of Poona and its neighbouring cantonments are particularly exposed to the danger of the disease being imported, from the custom observed of following up the pilgrimage to Vitoba by one to Dyanoba at Alundee, about 12 miles from Poona. It is not at every great Jutra that cholera appears; the disease was present in April 1864, while in Ashar and Kartik of that year it was absent.

It is the custom, as already stated, for the pilgrims to visit the temple of Kala Gopal at Gopalpoor on the 15th or last day of each of the great Jutra. This visit is attended with great license and revelry; caste is altogether ignored, and Koonbees, Brahmins, Mhars, and even lower out-castes, both men and women, join in the games and sports that their god Gopal (the same as Vitoba) is said to have enjoyed in his youth, and after dancing together under the suspended pot of curds, and smearing themselves and each other with the contents of the pot when it is broken, they all sup of it together. In the same court there is the temple of Junabae, in a vault with a narrow staircase, and apparently no other means of ventilation. The concourse at Gopalpoor on this occasion is said to be immense.

In Pundhurpoor also the observances of caste are greatly relaxed. The touch of a Mhar or Bhungee, which in another place would oblige a Brahmin to lay aside his dress and bathe, and would render water he was carrying useless, is not here so polluting. After such a touch a Brahmin says, "It is Vitoba," and may be purified by mere sprinkling with water before he enters his house by another Brahmin, and the water he is carrying becomes at the same time fit for use.

The revenue of the temple of Vitoba is not exactly known, but it is estimated that 60,000 rupees are collected in dukshina by the Budwae. The Government payment in cash is about 3,079 rupees, and the proceeds of a piece of land being added make the amount about 3,300 rupees a year. This sum is given to a committee, who spend it for the temple according to their discretion.

The burial-grounds are not numerous, but they are not sufficiently well regulated. In that of the Indoos, south of the town, human bones lie exposed. There is not sufficient care taken to register all deaths.

Since the year 1855 there has been a Municipal Commission in Pundhurpoor. It consists of eight resident members, four of whom hold Government office, and the other four are chosen from among the most respectable of the townsmen. They have a clerk on a monthly salary of 20 rupees, and an assistant clerk who gets 10 rupees a month. During the last year increased attention has been given to the duties of the commission, and it now has weekly meetings. The works that have been done are not very great as yet; the chief are the Purdukshun and some other roads, and six dhurumsalas or sheds for the shelter of travellers. The extensive latrine has before been mentioned.

The municipality contributes 550 rupees a year towards support of a charitable dispensary, the total expenses of which is 1,200 rupees. The remaining 650 rupees are derived from the rents of the village of Segaoon, on the opposite bank of the river, made over by Government for this purpose. The dispensary is in charge of a sub-assistant surgeon, who is a zealous member of the municipality. The yearly income of the municipality is about 10,000 rupees, raised by a town tax on all articles of consumption, without exception, that are brought in on carts or animals, and that are not again exported within eight days without changing hands. A tax of one quarter-anna also is levied on every piece of wearing apparel, great or small, that is sold. There is no house tax or other impost.

The want of power to punish for nuisance, owing to the limitations of jurisdiction laid down in the penal code, was said to have been much felt. Now, however, that the Mamlutdar has been made a subordinate magistrate of the first class, he will, it is presumed, be able to try such cases.

The Mamlutdar has his office and court in a mere shed, on the sides of a central square space, and his only gaol is a portion of that shed enclosed with wooden bars, that give it little security, and but little seclusion for the prisoners, who have their *ennui* relieved throughout the day by seeing and hearing all that is going on. It is abundantly well ventilated through its railed front, but it has no other sanitary advantage or requisite whatever.

There is much in the condition of the town that one would wish to see improved, and much in relation to the temples and the worshippers that one would earnestly desire should be changed, but in which improvement by summary measures is impracticable. Although the pilgrimage and the idol worship at Pundhurpoor cannot on the one hand be suppressed, and on the other ought not in any way to be encouraged or promoted, yet humanity requires that the great danger to life, as well to the pilgrims themselves as to the resident inhabitants, and to the people of the towns and cantonments in the surrounding country, which, in the form of epidemic disease, attends or results from the pilgrimage and worship, should by all legitimate and practicable means be abated.

The town is unfavourably placed, being partly at least on a stiff retentive soil, and being on the margin of a river, a situation that is known to be favourable to the location of cholera. The condition of the town with its crowded, ill-ventilated dwellings, and their filthy premises, its choked drains and foul water, is such as to foster the disease.

The site of the town of course cannot be altered, but its condition may be improved, and with a view to this I would recommend that—

1. All lodging houses be placed under the control of the Municipal Commission, with a

view to the prevention of overcrowding and to the maintenance of ventilation and due cleanliness in them.

The Municipal Commission might in the first place be required to submit for approval or amendment their propositions regarding the numbers of inmates that rooms of certain dimensions should be allowed to contain, when well ventilated.

The enforcement of such a rule seems quite legitimate under Act XXVI. of 1850, one of the objects of which is the prevention of nuisances, as in the "Nuisance Removal Act for England," under Part II., relating to the removal of nuisances, proceedings are allowed to be taken to abate overcrowding.

I would also suggest—

2. That measures be immediately adopted by the municipality to bring clean drinking water into the town at all seasons.

It is thought that, at moderate expense, water might be pumped from an inlet tower or well that might be erected in the river, about three quarters of a mile above the town, and conveyed by iron pipes to cisterns for distribution.

3. That the choked drains be thoroughly cleaned, and they be used for waste water only, not for night soil.

4. That two latrines of 60 seats each, one for males and the other for females, be erected between the south end of the town and the Hindoo burial ground, and that two others be built at the north end of the town near the river side and near the Satara road. Those situations appear the best that are available, both as regards the direction of the wind and convenience for the removal of the soil by cart to the fields. They might be constructed on the plan suggested lately to the Sholapoor Municipality. Water-tight tank carts should be used for the removal of the soil.

The latrine now being built to the windward of the town should be removed.

5. That the present pavement of the streets or lanes be not replaced by metalling, unless these lanes be made wide enough for commodious traffic with carts.

6. Potteries, and brick and lime-kilns, should be removed to a distance and to the south of the town. About half a mile above Gopalpoor, on the bank of the great nulla, would be an appropriate place for these works.

7. The prevention of the committing of filthy nuisances on the streets should be strictly attended to.

8. The burial and burning places should be registered, and no funerals should be permitted at unregistered places. And all burials and cremations should be carefully registered and tabulated, according to the forms that have been supplied through the revenue and police commissioner.

9. The police should guard the river opposite to and above the town from defilement. It would be impossible to prevent bathing and washing in the river, and it is not desirable to do so; but they should be allowed only at the south end of the town, below Pondalik temple.

The greatness of the number of those that congregate here at the Jutra, renders it impracticable to provide shelter for them. Their condition, however, during their stay might be improved, and with a view to this it is recommended:—

10. That a dry encamping ground be set apart for the pilgrims at Gopalpoor.

The ground there is hard, rocky, and gravelly, and it is high above the level of the river, yet close to it, so that water is obtainable without difficulty. It is only three quarters of a mile from Pundhurpoor, from which there is a made road.

Another spot has been thought of; it lies to the west, at about the same distance from the town, on the gravelly or rocky ridge that begins at Pudmawuttee temple. This spot could not be occupied at present, on account of the want of water, but were it required in addition to Gopalpoor, the watercourse running near it might be embanked so as to impound the water.

11. That a sufficiently large body of police be employed to prevent any one encamping in the river bed, the dampness of which is unwholesome, and especially so when cholera is near. And that thorough cleanliness be enforced by the police on the encamping ground.

12. That to promote the cleanliness of the camp, field latrines, in the form of narrow deep trenches, be dug in the earth at a short distance to the south of it, and that to these only the people of the camp be allowed to resort. That daily some of the earth that has been dug out of the trenches be thrown in to cover the soil there deposited.

From conversation with some of the leading Budwae Brahmins, and from the opinions expressed by members of the Temple Commission, it is thought that there would be no objection to such alterations in the temple as are now to be proposed, seeing that they would not interfere with the Budwae collecting the dukshina without loss.

13. It is proposed, in order to promote ventilation and to allow of the quick transit of the worshippers through the Gubhara of the temple, that the first antechamber, or that next to the idol's room, should have a doorway opened in its north wall and another in its south wall, each six feet high and two and a-half feet wide. That the south one be barred with iron as strongly as the Budwae may wish, and that the northern one be furnished with

with a barred door to open and shut, and allow of the exit of the worshipper and save him from having to push his way back by the way he came, and through the entering crowd. Also, that instead of the present small aperture in the roof, a ventilating shaft two feet in diameter be inserted. This might be covered with a cowl, to prevent the admission of rain, and thus remove the only objection that was made to it by the Budwae when at the visit it was proposed to them.

The opening of the doorways in the antechamber is not contrary to the Hindoo religion, as the question has been so decided on its being referred to Shastrees by one of the Temple Committee (or Punch), and at the time of this visit the neighbouring temple of Rookmaee was having the wall of its antechamber broken down to allow of the purdukshun or circumambulation of that temple.

14. That the present plank door on the south side of Chaokambh room be replaced with a barred door, and that opposite it, in the north side, a similar doorway and door be made.

That the present plank doors at the north and south sides of the Solkambh be replaced with barred doors.

15. That the Namdeo or eastern gate of the Subha Mundup be made the entrance at the Jutra, as it now is at other times, and that the Subha Mundup be given for the accommodation of the visitors.

16. Should any valid objection to throwing open the Subha Mundup be maintained, then most imperative orders should be given to the policemen on duty at the door of the Gabhara, not to admit more than 10 persons at a time, and not to allow of any fresh admission until assured that the 10 already admitted have gone out again. At present the policeman cannot know who have left the rooms, but as I fully ascertained on the spot, it may be arranged by two policemen being on the terraced roof, one on the parapet overlooking the door of exit at the north, to pass the word to the other policeman as to how many have gone out, the other man being at the south parapet to communicate the information to the policeman below at the door of entrance. By these arrangements the religious observances of the people would be in nowise interfered with, and the collecting of their perquisites by the Budwae would only be rendered more easy.

To Government in the Revenue and Police Department, I beg leave to suggest:—

17. That an appropriate lock-up or gaol be substituted for the present one connected with the Mamlutdar's Court.

A. H. Leith, M.D.,
Deputy Inspector General of Hospitals,
President, Sanitary Commission.

Bombay 28 February 1865.

REPORT on the Sanitary Condition of NASIK.

(Inspected in October 1865.)

NASIK, in latitude $20^{\circ} 0'$ and longitude $73^{\circ} 51'$, has an elevation of about 1,830 feet above the sea level, and is 56 miles in a due east direction from the nearest point of the sea coast.

It is in the Admednugger Collectorate, at the distance of 88 miles N.N.W. from the town of the same name; and it is 103 miles north of Poona. The north-eastern branch of the Great Indian Peninsular Railway passes within four miles, at Deolalee, south of Nasik. The distance from Bombay by railway is 116 miles.

The country around Nasik is a plain with hills of rugged outline rising abruptly from it. There is a group of these hills, in which there are some cave temples, and among which the hill fort of Ramsej, seven miles distant, stands 1,460 feet above the plain. There is another group about six miles south-westward of the town, near Patordee, in which also there are rock-cut temples of Boodhist origin.

The flat-topped hill of Unjuneree, about 4,300 feet above the sea, is on the western horizon, at a distance of 14 miles. There is an abundance of water; some of the few European inhabitants of Nasik have bungalows on the hill, where they reside in the hot season on account of the refreshing coolness of the air. Unjuneree is on the way to Trimbuk, but there is no made road to either place, and the ascent of the hill is arduous.

The only rock in the district is trappean. The soil varies, but much of it is regur, or black soil, that is very retentive of moisture. The articles cultivated are cereals, chiefly bajree and wheat, pulse, oilseed, and tobacco; vegetables and grapes and other fruit are grown for the Bombay market.

The plain is traversed by the Godavery river, which is joined where it passes through the town, by the Wagudee from the left, and about a mile and a half below Nasik; another tributary, the Nasurdee, flows into it from the right. With the exception of the clumps about villages, and of a mile or a mile and a half of the south and south-

east of Nasik, where there are fields and gardens enclosed with hedges and shaded with mango, tamarind, and other trees, the country is open, and nearly bare of trees for many miles.

On the west of the town and very near it, there are old quarries in which foul water was seen to have collected, and beyond these the ground is irregular from the remains of former brick-kilns, which had very properly been removed from the windward of the city to the other side of the river and south of Punchwuttee. On the site of those former brick-kilns the gunpowder makers now have their works. Still further west on the open plain and about a mile from the city, there are the remains of temporary barracks that were occupied by a detachment of European infantry during the mutiny.

It is found from the register of thermometric observations kept at the Civil Hospital in the town, that the mean temperature during 14 years was $73\frac{1}{2}^{\circ}$ Fahr. Although it is likely that the observations were not always carefully made, yet it may be presumed that in so long a series the errors of excess and deficiency have been mutually compensatory. It has not been ascertained whether there is or not any index error in the instrument. The mean temperature of the year deduced from the register is 3° below that of Poona, as recorded at the Cantonment Observatory in the last eight years, and the differences in the temperature of the months from October to March are still greater. In the months of June to August the temperature of Poona is somewhat less than that of Nasik.

RESULTS of Observations of the Temperature of the Air with Fahr. Therm. during 14 years (1851 to 1864) at the Civil Hospital, Nasik.

	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.
Mean -	62·3	68·3	73·8	80·9	83·6	81·6	76·6	75·6	74·7	72·1	68·6	63·5

There is nothing in the altitudes of the two places to account for their difference of temperature, as both are at nearly the same elevation above the sea, and their difference of latitude would account for barely half a degree. Although it is not apparent why the temperature at Nasik should be so much lower than at Poona in the colder months, there is a manifest cause in the positions of the two places with reference to the sea, why in the hotter months one should be cooler than the other. Nasik is a little nearer to the sea coast, and owing to a re-entering bend in the tortuous and broken outline of the western scarp of the Syhadree range, the north-west breeze has to pass over only 15 miles of intervening low hills and plain, and loses but little of its freshness ere it reaches the station, while the distance of Poona from the brow of the mountains overhanging the Konkun is nearly three times as great.

The average quantity of rain during 15 years has been 28·22 inches, and it has fluctuated from 17·26 to 34·96 inches. Were Nasik as near to the mountain scarp on the west and south-west as it is to the north westward, the rainfall would be heavier than it is, but westward there are high intercepting hills, and south-westwards, towards Egutpoor, although there is little but open plain, the distance is 26 miles, and the clouds forced up from the Konkun by the wind, have time in which to discharge their condensed moisture and to attain a yet higher elevation before they pass over Nasik.

MEAN Rain-fall in Inches registered at the Civil Hospital, Nasik, during the 15 years, 1850 to 1864.

	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.
Mean of 15 years -	·02	·01	·08	·08	1·15	5·54	7·63	5·18	4·66	2·94	·63	·23

The average yearly fall of rain at Egutpoor (Vigutpoo) during the four S.W. monsoons in which it has been registered, may be compared in the following table with the rain-fall at Nasik during the same periods. The Mamlutdar's registrations are not continued through all the year, but only from June to November, and they only profess to give the amount of the south-west monsoon fall.

AVERAGE RAIN-FALL of four S. W. Monsoons—1861 to 1864—at Vigutpoor (Egutpoor) and Nasik.

		June.	July.	August.	September.	October
Egutpoor	- - - - -	1.11	46.21	37.03	16.31	3.89
Nasik	- - - - -	5.88	6.85	3.99	4.34	4.22

The quantity of rain that fell at Egutpoor, as shown by the table, was more than five times greater than what fell at Nasik.

The town occupies nearly a mile of the right bank of the river, where, in its serpentine course, it runs south-eastward between sloping hillocks. A part of the town, of about a seventh of its area, and called Punchwuttee, is on the left bank, on rising ground between the Aroona Nulla and the Wagudee River where they join the Godavery.

The town on the right bank consists of an older and a newer part, and there are three small hills or elevations on which it is built. The northern one is that on which the more modern part stands, and on which there is the old palace, now occupied as Government offices. The ground falls eastward, but it still has elevation enough to form a low bluff at Sarungputtee on the river side. The next elevation is in the middle of the town, and runs south from Tambut Alea and the Durga, and from the Tekh and Sonar Alea to Mooltanpoor. These two hills are separated by the Suruswuttee Nulla. The third hill is that on which there are the ruins of Joonee Gurhee or the old fort. Both this hill and the Tekh have an elevation of probably 60 to 80 feet above the river, and, in their precipitous cliffs on that side, show indisputably that artificial mounds had been added to the natural hills, on which it is likely fortifications were placed to command the river. There are still some remains of brick masonry visible on the face of the cliff. There is a ravine between the Tekh and Joonee Gurhee, and on the other side of the latter, the Nagjeera Nulla forms the lower boundary of the town.

The hilly surface on which Nasik is built may afford a reason why its streets and lanes are so irregular and crooked as they are. It may also be a reason why nearly all are paved, because with a fall so rapid as they generally have, any other than a paved surface would be worn by the strong current of the storm waters in the rains. Experience has proved this in the last south-west monsoon when the metalling of some steep roads, that as an intended improvement had been macadamized, was torn up and washed away. The metalling may be admissible where the roads have a gentle gradient and where they are wide enough for cart traffic, and where the traffic is very great, as it makes the transport easier; but in a sanitary aspect the pavement is by far preferable for the town roads, if it be well laid and kept in repair, because it prevents much of the soaking or imbibition of impurities into the subsoil, that a softer surface would admit. It was seen, however, that the pavement in nearly all the streets was in great disrepair.

The streets appear to be mostly from six to 10 or 12 feet wide, and the Bura Suruk and part of Tambut Alea are perhaps the only roads that are wider. The former is 18 feet wide. It is metalled and has open gutters, but they are formed solely with the kerbstones on one side and the foundation walls of the houses on the other, without any masonry inverts. These gutters are but open cesspits allowing foul liquids to soak into the foundations of the houses.

The city is not walled, but it has gates at the ends of the streets opening on the river side, such as the Ushra, Nao, Delhi, and Suttee gates, and towards the southern and western suburbs the Bhugooda, Trimbuk, and Mulhar gates.

Nearly all the houses have upper floors, and some have more than one storey. They are on plinths two or three feet high, with often an open recess on the ground floor like a verandah. The houses are built in line, and are generally constructed of brick masonry end walls and wooden fronts. The floors of their upper rooms are always of plank, never of concrete or plaster. The people sleep on the floor, and a cot or bedstead is very rarely seen. They are well supplied with windows with wooden shutters; none have glazed casements. Most of the houses are roofed with coarsely made tiles.

The general appearance of the houses gives the impression of more comfort and affluence than is usually met with in the Dukhun, and many of them have their wood work highly ornamented with carving.

Beside the houses that have been thus described, there is a considerable number of the residences of Sirdars and men of property which are built on another plan. They consist of a square court, or chouk, that is entered by a door in a dead wall towards the street, or if there are windows, it is only in the upper floors that they are seen. The court has an open corridor on its four sides raised two or three feet above the central ground or pavement, at one side of which the household idol may be placed. On the upper floor there is an open gallery corresponding with the lower corridor. The dwelling apartments open into the gallery or corridor. There is sometimes a second square communicating with the first. Notwithstanding the outward appearance of the houses, it is said that there is much

poverty in the town, and that many mansions are falling into decay, because the owners have not the means of keeping them in repair.

In the older part of the city the eye is but seldom offended in the streets as it is at Poona and Sholapoor and Ahmednuggur, nor is the aid of pigs required as at Pundhupoor. This part of Nasik has a system of house drainage. Nearly every house has its privy, and this, as well as the bathing place, has communication with the drain that is under the centre of every street and lane. What is offensive is thus kept out of sight, and although it stagnates dangerously below the surface, it is better that it should do so than that it should stagnate still more hurtfully in open gutters. The drains are roughly constructed, and the supply of water for household purposes is so scanty, that they are never flushed, unless where from the imperfection of their covering, the water during heavy rains finds free entrance. From obstruction or from fault in the gradient at a more than usually level part of its course, there is the liability to the filthy contents of the drain making their appearance through the interstices of the pavement after rain—this was witnessed at the inspection.

Although the streets contrasted favourably with those of some other towns, there was much filth found on inspection in the dwellings and the courts and recesses of the premises; there were heaps of refuse, and where cattle were kept the dung and litter were allowed to accumulate. Among other instances of this dereliction of cleanliness there was that of Rajah Buhadur Waree, rented by the mounted police. There was the court that is usually found in the old Sirdars' houses, having its central square open to the sky, and with its unpaved or but partially paved ground sunk two or three feet below the corridor floor. The corridors were occupied by the men's horses, with here and there accumulations of dung; and in order to allow of ready communication from one part of the court to another, as there were no steps in use, inclined planes were made of the foul litter. The men occupied the upper galleries that opened on this court as dormitories. It was said that inquiries were being made for a more appropriate place for those policemen and their horses. Filth was allowed to accumulate at nearly every gate or outlet of the city. This was the case at the Bhugooda gate, near which, in the Mahadeo and Tulaoree districts, there is a considerable suburban population living in miserable houses, in bad repair, with unmade roads, or lanes among high prickly pear and euphorbia hedges, and the bed of the Lenkee and the neighbouring ground outrageously defiled.

Near Tulaoree and opposite a Peerzada residence, there was a low lying swamp that had probably been a tank that had become silted up. Apparently no attempt had been made to drain the swamp. The base of Joonee-gurhee and the Tekh at Doorgaree were the common resort of the people around, who had no privies. Ushra gate was a particularly filthy place; close to a dense population the foulest refuse and soil were lying on the river side, and the premises of a ruinous house were continuing to be used as a latrine, although no sweeper ever visited it. Ooma Maheshwur and the Suttee gate also were places where refuse was allowed to be thrown out and to accumulate.

On the outskirts to the north-west, or windward of the town, there is a very unclean and miserable collection of hovels, called Garpooree, inhabited by Purwaree, and in that neighbourhood potters were carrying on their trade and causing great nuisance from using litter and sweepings as fuel.

The district of Punchwuttee, on the left bank of the Godavery, has several large temples, and it has a numerous Brahmin population. Its houses are mostly substantial and in good repair, but there are some old buildings that are falling into ruins. Raja Buhadur Dhurmsala was in this condition. It was rented by cowkeepers and others; the cattle occupied the corridors in one of the courts, and the unpaved, undrained central square was the receptacle of all kinds of impurities. The other square was even more foul, as all the filth that was thrown into it appeared to be left there, whereas from where the cattle were kept it was occasionally removed with the cowdung as manure. Behind this great building there was a space that was formerly a garden, but now the dunghill of the neighbourhood. Behind the temple of Kala Ramchundur, in the middle of the district, the ground was covered with ordure. Beside Naroo Shunkur's temple of Mahadeo, or the Gunta temple, the ground was in a similar state, and the pools that remained after the recent rain, from inequalities of the surface, were very offensive. The bank of the Godavery, where the sacred stream was joined by the Wagudee, was so foul with odure, as to be almost impassable. There is no drainage in Punchwuttee.

The storm waters flow rapidly from the hilly ground on which the town on the right bank stands, but the declivities are too great for satisfactory drainage, at least along the present lines of road, owing to the force of the current being so great as to be destructive.

The present street drains form several systems that discharge by sewers into the river bed, either directly or indirectly through the Suruswuttee Nulla. The outlet of the sewers is at the side of the river bed, where the stream reaches the deposit only during floods. The natural fall of the ground has been the chief guide in constructing the present main drains, and they generally take the shortest course that the levels will allow to the river, or to the Suruswuttee. The Tekh drain has its outfall over the face of the cliff. The Ushragullee drain pours out its contents beside the gate of that name. At the Nao gate passes out the drainage of Mudlee Hoolee, Tewnda, Durga, Musooba, Tekh, Bhadur Kalee, and the eastern part of Tambut Alea. The sewer from Gondalee gullee and part of Poonakur gullee has its outfall at the Delhi gate. The neighbourhood of Gora Ramchunder temple and Sarungputtee and that of Ooma Maheshwur, and again that of Dangur Ootara have their separate drains into the Godavery bed. The sewage from

from the hospital and its vicinity passes by the Sutte gate. All these drains cause much evil in their course, from their imperfect construction, and at their outfalls on the river side; but these outlets are at one side, and to the leeward of the greater part of the city with reference to the prevailing wind. The evils attending them are therefore small compared with that of the drainage that falls into the Suruswuttee. This nulla is the natural channel by which the rain waters flow from the ground immediately west of the city and from the centre of the city itself. From where it enters the town at the Trimbuk gate, it has a northward course to the new palace, whence it runs eastwards for a short distance to the river; it is bridged at its bend, and the locality is from that called the (bridge or) pool. The nulla is deep and wide, and it has rocky and uneven bottom and sides. Its fall averages 1 in 45, so that in heavy rain the torrent must be powerful, and judging from its 16-feet wide mouth, the volume of water must be great. No large quantity of water can remain in the nulla, but pools are left in hollows in its uneven bed.

The Suruswuttee nulla receives the house drainage from Pinjar ghat, Helbaoree gullee, Hoondee gullee, Bembeepoor, and the western halves of Tambut Ale and Poonakur gullee, all one side, and from the streets in the neighbourhood of the old and new palaces on the other side. The houses on its margin have their privies so placed as to discharge the soil into it in a shameless way. What falls or is thrown into this foul receptacle remains there until it evaporates, or until heavy rain makes a torrent to wash it away; a reference to the table of rain-fall shows that during five months in the year there is no likelihood of there being a sufficient quantity of rain to flush it. Its condition, when visited even soon after heavy rain, was overpoweringly offensive, and it was said, by those who from experience could believe it possible, to be still worse at a later time of the year. The evil is of great magnitude and urgently requires to be remedied.

The river bed has an average breadth of 140 yards, but it is only for a short time during floods that it is full. In October the stream at the upper part of the town was divided into several channels that were separated by grassy and rocky shoals, and opposite the middle of the town it was contained within masonry embankments, built for the convenience of bathers. This built channel is 39 yards wide. The stream was again broader below that point and opposite Nao gate, but was easily fordable, having only about a foot depth of water. The drift left on the banks below the city, and the marks on the temples standing on the bed of the river, gave the means of ascertaining that the height to which the flood had recently risen was 19 feet above the present level. The drainage area that contributes to this great rise is between 290 and 300 square miles in extent, and the farthest source of the Godavery is at Hurshwaree, west of Trimbuk, and 20 miles from Nasik in direct line, or 32 miles along the course of the river. When the river is in flood, the ground-floors of the houses on its bank, between the Ushra and Delhi gates, are inundated. A ferry boat plies when the water is deep, but at other seasons the river can be easily forded, and two masonry dams give paths by which to cross during the greater part of the year. Last hot season, owing to the preceding monsoon rain having been scanty, the river ceased to flow, and there were but dirty stagnant pools in its bed.

There are several small temples built on the bed of the river, contributing much to the picturesque beauty of the scene, but the stream is more or less hurtfully obstructed by them, especially by Venkuteshwur temple near the Pool.

From the Pool to the Delhi gate there is a stone-paved terrace about 44 feet wide, in front of the houses that line the bank, and there is another terrace at a lower level, running 110 yards along the mid-channel, forming one of the embankments already mentioned as affording convenience to persons washing or bathing when the river is low. The ground between these terraces is depressed, and a backwater is formed on it, or rather what at the visit was a filthy, shallow pond, that received the sewage brought down by the Suruswuttee nulla; this pond had an area of 2,420 square yards. The assistant magistrate mentioned that he had determined to make a drain to divert the dry weather flow of sewage from entering it, but while it exists filth cannot be prevented from collecting in it.

The supply of water is deficient in quantity and bad in quality. The water of the river when not in flood is too impure to be drunk, and the wells, with few exceptions, do not give drinkable water. The Return at the Census of 1851 stated that there were in the township four tanks, all outside the town; 830 wells belonging to householders in the town, seven in the bazars, 55 in the suburbs, and 197 in the fields. Of those in the city and suburbs, from which the townspeople drew, only four yield water that is drunk throughout the year, and of these Helbaoree, within the Trimbuk gate, is relished probably only on account of its being connected with a sacred durga. The others that are reported to give good water are Soobadar baoree, south-west of the town beside Dhondoo Punt's Paga, Burdez baoree, also a well between the Joonee Gurhee and Nagjeera, and a small well near to and outside of Bhugooda gate. Some others yield water that is considered drinkable, for a short time after the rains, but which in the dry season becomes brackish. Of this number is the Bhudur Kalee well, the water of which was analysed in October 1855, and then had in a gallon 62.64 grains of solid impurity, of which 32.53 grains were nitrates. This source cannot have become less impure in the last 10 years, and there is little doubt that, with so abundant a supply of organic matter as has year after year been allowed to soak into the subsoil, from the imperfect drains, nitrates would on analysis be found to be abundant in all, while in some of those in lower ground than Bhudhur Kalee, these salts would be found present in even more abundance. The depth of some of the wells is great: the Sathpueree at the Top Mundaee, is named from its descent of 60 steps, and there is a well at the Durga, which, although 90 feet deep, was

dry even in October. The water of Helbaoree in the same month was 35 feet from the surface. The best water that the inhabitants have is brought by conduit from the Nasurdee river on the westward, a distance of about a mile and a-half, and is delivered by fountain beside Dhondoo Punt's Paga. This conduit, it is said, was constructed by Dhondoo Madadeo 60 or 70 years ago. It ceased to flow during several months of the year, until it was repaired recently at the expense of the Honourable the late Jugonnath Sunkurset. It is now expected to flow uninterruptedly through all the year. It is deservedly well appreciated by the people.

There are no proper market places. The Gunj, near the new palace, is the chief place resorted to by sellers, and they obstruct the thoroughfare by laying out their goods to view upon the ground. There is a place where grass is sold at Top Mundaee, and another at the north end of the town, at the Sutte gate. In the fair season, when the river is easily crossed, there is a market at Punchwuttee. The beef butchers slaughter and sell the meat at a place a little to the south of the town. The mutton butchers slaughter the animals at their own houses, near the south end of the Bura Suruk, where they have their shops; and in that locality, which is to the west and windward of the densest part of the town, there are tanneries.

The brass and copper ware vessels made at Nasik are much sought after, and many are said to be sold in the country around; and rice is sent in considerable quantity to Ahmed-nuggur, and fruit to Bombay; but there is no considerable outward trade except in these articles.

Nasik owed its former importance, and owes much of what it still has, to the faith the Brahminical Hindoos have in the sin-cleansing virtue of waters of the Godavery. Among the temples of Nasik, it is only that of Kala Ramchundur in Punchwuttee to which there is a periodical yearly Jutra. This Jutra takes place about April on Ram Naomee, celebrated as the birthday of Ramchundra, the seventh incarnation of Vishnoo. It is attended by from 5,000 to 6,000 persons, who come from distances not exceeding 30 or 40 miles. As it is in the hot weather, the pilgrims that do not find accommodation in the houses lie in the open air.

Nasik is a thoroughfare at all times of the year for the many pilgrims who visit Trimbuk; and it is visited by large numbers at the great Jutra, which is observed at that place every 12 years; the last period occurred in the year 1861.

The population was stated in the year 1826 to be about 30,000 persons, and probably correctly so, as it appears to have been greater in former times than it now is. The number, according to the census of 1851, was 21,860 persons, the females being a little in excess of the males, owing, it is said, to the fact that widows come here in considerable numbers to spend the remainder of their life. According to the same census, there were 3,687 houses, of which 3,505 were tiled. The enumeration of houses made lately with the greatest exactness, for the purpose of municipal assessment, showed the present number to be 3,445, or a little fewer than it was said to be in 1851. By the census returns of 1851, there were about six persons to a house, and if the same proportion be assumed in estimating the present population, the number of inhabitants is found to be 20,425. As the houses cover about 271 acres of ground, there are 64 square yards for each person.

There are no military hospital returns, with the strength and admissions accurately noted, that can be used as a criterion of the salubrity of Nasik. Any considerable number of troops that has been stationed here, has remained but a short time, and under such circumstances it is not easy to separate imported disease from that due to endemic cause.

The dispensary and civil hospital returns give only the numbers of admissions for the various diseases, and do not show the number from which those admissions took place, and the applicants for medical aid at such institutions can be but a small part of the sick of the town, and probably represent its most destitute portion.

The admissions at the dispensary for fever during the 15 years 1850 to 1864 were 3,344, and they were distributed among the 12 months in the following millesimal ratios:—

January.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
97	59	67	80	72	80	99	90	72	74	98	112

This does not show the marked increase, after the south-west monsoon, that is seen in the returns of sickness at places where paludal miasm is in great activity; and from the periods of the most numerous admissions coinciding with the times when, on account of the rain or of the cold, the people were most shut up in their houses at night, it may be assumed that the fever here noted was in great part of ochletic origin, or was due to overcrowding in a foul town. The increase in April may be attributed to the influx of pilgrims at that time.

In the same period there were seven years, but not consecutive ones, in which there was no admission for cholera, and two years in which there were respectively but one and two admissions for that disease. The years 1854 and 1864 were those in which it was most severe. The disease appeared fitfully except in 1864, when it persisted from

January

January to June. The centesimal ratios in which the 953 recorded cases occurred in the different months were :—

January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.
3.3	9.9	8.3	34.2	28.3	9.3	6.5	0.1	—	0.1	—	—

The Hindoo cremation and burial place was formerly near the Sutte gate, but two or three years ago it was very properly removed to the south of the town where the Nagjeera nulla joins the river. This locality seems to be the best that could be found, but the exact spot that is chosen is objectionable. It is in the bed of the river, and as it cannot be used during floods, irregularities are committed at those times, and interments are made anywhere in that neighbourhood, but chiefly at Joonee Gurhee, where, as was also said, infants below the cremation age of two years are always buried.

The Moosulmans, as is usual elsewhere, have numerous burial grounds, and every Musjeed or Peer's resting place, whether in or out of the town, has graves about it. Their chief burial place is at Jehangeer Musjeed, at Top Mundaee, outside and on the south of the town. The Europeans' burial ground is also to the southward of the town at a greater distance from it, and near the Travellers' Bungalow.

The Municipal Act has not been long in force, and the Municipality has not yet undertaken any works of improvement. The expenditure has hitherto been for scavenging and repairs. There are four filth carts and 15 sweepers employed; the number of sweeper families in the town amounts to 20. The income is solely from house-tax, and the assessment for the current year is at rates varying from half a rupee to three rupees a-year, and the amount expected to be realized is 6,207 rupees. The appearance of the town favours the opinion that higher rates would be easily borne, and the Municipal Commissioners, being of that opinion, wish to add the higher rates, four and five rupees.

RECOMMENDATIONS.

The very foul state of the Suruswuttee nulla in the heart of the town is the most obtrusive evil, and a remedy for this is earnestly sought by those who have the management of the Municipal affairs. Arching over the nulla has been proposed as a means of abating the nuisance, but the expense would be more than could be met. It has also been proposed to lay a cast-iron main drainage pipe along the bottom of the nulla for the fair weather sewage, which it would receive from the street drains by branch pipes, and carry from this and from all the drains that now open on the river side, by a cast-iron main that would be laid from Dangur to Ootura at the most northern part of the town, to the mouth of the Nagjeera nulla, at its southern boundary—the distance between these two points is 5,920 yards. The estimated cost of this scheme is 112,000 rupees. Although the fall is great, yet there is room for apprehension that the pipes would become choked unless branches of them were to be substituted for the street drains and house drains and communicate with the houses by grated openings only; but the carrying out a scheme so comprehensive as this has not, it is thought, been seriously contemplated. The imperfect construction of the street drains is such, that they readily admit earth and grit through the interstices of their masonry, and instances were seen at the inspection where drains were actually thus choked. There is reason to fear that the iron mains could not be kept clear with such feeders as they would have.

However much it may be desired to adopt and at once to carry out the best and most comprehensive measures for the improvement of drainage, it is obvious that, with the small pecuniary means that are likely to be available for the purpose, some scheme far short of perfection is all that is practicable.

1. To remedy the great evil arising from the Suruswuttee being the receptacle of sewage, it is recommended :—That no drains be allowed to discharge their contents into the nulla, but that on its right side the street main of Hoondree gullee, which receives the drainage of Pinjarghat and Helbaoree gullee, instead of opening, as now it does, into the Suruswuttee, should be continued into the existing drain of Bempeepoor, that runs like it parallel to the nulla, and which receives the sewage from parts of Tambut Aleo and Poonakur gullee, and that the united drain be continued until it reaches the river side. Thus these existing sewers might, at little expense, be converted into an intercepting drain for the right bank of the nulla. The drainage now falling into the Suruswuttee nulla on its left bank should also be intercepted, and for this purpose a new drain would probably have to be constructed, but the extent of drainage area on that side being comparatively small, the drain would be but short. There should be a main sewer along the river side to carry the sewage to a point below the town, as proposed by the executive engineer, but it should be of masonry, not iron piping, to allow of its being cleared out as well as flushed. This river side sewer might in the first instance be made from the mouth of the Suruswuttee nulla downwards, and the main for the upper part of the town might be subsequently constructed, so that no sewage should fall into the river. No drains

drains should be allowed to discharge into the Suruswuttee nulla, it should be reserved solely as a channel for carrying off the storm waters. The discharge of privy soil and the throwing of filth into the nulla from the houses on its banks ought at once to be peremptorily interdicted, as being an intolerable nuisance. The openings of the privies and drains into the nulla should be closed. If needful, as it very probably may be for a little while, a man should be placed for the sole purpose of preventing and reporting infractions of the prohibitory order.

2. The levels seem favourable to the utilization of the town sewage as manure in the fields, when conducted to the spot mentioned, which is below Talkootia's temple to Mahadeo, and the Municipality should use every endeavour to induce the cultivators in that locality to make use of the liquid manure.

3. It is recommended that a filth cart, capable of containing night soil and house refuse, be sent every night to visit Bembeepoor and such part of Hoondee gullee as may be wide enough to admit it, in order to give the inhabitants facilities for the proper disposal of the filth which they now throw into the nulla. The cart should visit also the line of houses between Bura Suruk and the nulla, for the same purpose.

4. There should be an appointed place of deposit for filth, out of the town, at its south or south-east side, as the wind blows but seldom from those points. An appropriate place might be found either eastward of the mouth of the Nagjeera nulla, or in the swampy field at Tulaoree, which might be purchased at small cost and drained for the purpose. Another place of deposit might be found to the south eastward of Punchwuttee.

No sweepings, litter, or filth of any description, should be permitted to be deposited at any other places than those appointed. Nor should any accumulation of filth or manure be allowed in private premises within the town. To prevent this, there should be men appointed to the duty of visiting the houses in all parts of the city. A sufficient number of scavenger's carts should be employed; the present number cannot be enough to meet the requirements of cleanliness, even if they be supplemented, as proposed, by pack donkeys for the narrow lanes.

5. To supply the wants of those whose houses have no private conveniences, a latrine for males and one for females should be provided where they are obviously most wanted. The localities that should be first supplied are at the north and the south ends of the town and at Punchwuttee. Near Dangur Ootura or the Sutte gate it appears would be as favourable a place as could be found for the northern latrines; they should not be placed on the west or north-west of the town. Some spot between Bhugooda gate and Tulaoree should be chosen for the south of the town. Doorgaree, under the cliff of the Tekh, is a place where latrines would be very useful if a road to it could be made above the reach of the river floods. For Punchwuttee, latrines should be placed to the south-eastward of the district.

When this provision is made for the wants of the poor, there should be a strict enforcement of the law against the commission of such nuisances as the latrines are intended to abate. Pending the construction of latrines, it seems advisable that use should be made of field latrines, in the form of narrow trenches in the earth, into which part of the excavated earth should be thrown daily to cover the soil deposited.

6. The river bed between the Pool and the Delhi gate should be improved, by filling up the hollow between the inner and the outer terraces. It would be useless merely to fill it with earth or gravel, as this would be displaced by the first freshet. The surface should be faced with stone or rubble.

7. Where the gradient will admit of the metalling lying on macadamised roads, and the demand for the employment of wheeled transport is great, such roads may be desirable; but for sanitary reasons the present stone pavement is the best for Nasik. The pavement, where out of repair, should be relaid with more attention than has been given to fitting the stones one to another, so as not to leave wide crevices. Each householder should be made to keep the pavement opposite his house in repair.

8. For the sake of the benefit that would attend better ventilation, every opportunity offered by a house becoming ruinous, and every other occasion, should be made use of to widen the streets. The Chubootra or stone benches should not be allowed to project into the streets to the inconvenience of passengers and the obstruction of traffic.

9. The tanneries and potteries should all be removed out of the town, and in a south-eastern direction.

10. The slaughtering of animals should be allowed only at some appointed place outside of the town—it might be near where the beef is sold in the southern suburbs.

11. A proper market-place should be provided either in the town or close to it on its western side, and where it would be of easy access to all.

12. A site for burial grounds should be found in the neighbourhood of the place now used by the Hindoos, but out of the reach of the river floods. Burials elsewhere should be prevented.

13. The Municipality should do all in its power to obtain a more copious supply of pure drinking water. It is probable that the Nasurdee river, which now supplies Dhondoo Punt's

Punt's Kurunja, and which is conveniently near, would afford a sufficiency for several other fountains. Or if the quantity obtainable from that source be too small, it will be advisable to examine into the practicability of bringing water by conduit from the Godavery above the town.

There is not one of the works that have been now mentioned that is not of high importance. Some of them may be easily carried out at once, but there are others, that are connected with the drainage, paving, and supply of water, that will be attended with much expense, and to meet which the present income of the Municipality is inadequate.

14. It is recommended that other means should be adopted for increasing the Municipal funds besides raising the house tax, which, even when the rates for it are increased, will be sufficient. An octroi is what most readily suggests itself as least objectionable under the circumstances.

(signed) *A. H. Leith, M. D.*

REPORT on TRIMBUK.

(Visited in October 1865.)

THE village of Trimbuk is 18 miles nearly W. S. W. of Nasik, in a basin about three-quarters of a mile diameter, and almost surrounded by high hills. Although it is only three miles in direct line from the western face of the Syhadree mountain range, yet it is almost completely excluded from western breezes by the intervening hill on which the nearly inaccessible Fort of Trimbuk is built. This Fort is 4,255 feet above the sea level, and probably about 2,000 feet above the village, and the hill on which it stands presents towards the village a steep slope at its base, formed by the accumulated fragments of trap rock that have fallen, and above this a mural, in some places an overhanging cliff of probably 1,000 feet in height. A wall-like ridge of lower elevation is continued eastward to the table-topped Unjuneree hill, which equals Trimbuk in height. In this connecting spur there is a gap, named Mahadurwaza, at what is called Kotla Modla, but this opening can do little towards ventilating the valley. The bottom of the basin is uneven, it is partially cultivated, and in some parts it is swampy.

The village has only 562 houses, and a population of about 3,082 persons, and would not be deserving of particular notice were it not a far-famed place of pilgrimage, to which many resort at all times to bathe at the reputedly sacred source of the Godavery, and at which there are two annual Jutra, and a more celebrated one every 12 years, that brings an immense influx of pilgrims.

Trimbuk is in the middle of the little amphitheatre of hills. The ancient outline of the village is broken by the cultivated patches that now occupy the place where houses once stood, and that show the extent of its decay, or at least of its diminution. It consists of single houses with small walled gardens or courts, and of rows of houses placed irregularly, but here and there forming a street. The bazar is a narrow, crooked lane, eight or ten feet wide, with shops on either side in the lower floors of the houses, that are of two and a few of three, low storeys: the road is of loose shingle.

In other parts of the village there are many large houses that are well built, and some of them have ornamentally carved verandah posts and gorbals. All are on well raised plinths, and most have deep verandahs; the roofs are tiled, and have a great pitch and far-projecting eaves, and some of the houses have weather boards as a further defence from rain, which, judging from these defensive expedients, must be heavy. The tiles are flat with turned up edges, like those at Nasik and the city of Poona. The lanes and passages between the houses are unmade, uneven, and in wet weather very muddy. There is one line of road laid with stone to allow the idol car of Trimbukeshwur to be taken in procession.

There are several well-built temples of cut stone, and there is a large Muth at the Gunga temple in the middle of the village, where Gosain, or other religious mendicants, are accommodated.

A large portion of the inhabitants are Brahmins, who are connected with the temples. There are also men of different trades, and a considerable number of shopkeepers. The greater part of the population, however, consists of Koolee, not of the hill tribe, but cultivators, who here and in Pengulwaree and other villages take this name, which appears to be synonymous with the Koonbe of other parts of the country. There is but one family of sweepers, and they are said to be employed in cleaning the streets, and to be very seldom called to the premises of the inhabitants, as the domestic arrangements are thought to be such as to supersede their services. It is usual for a family to have a drain leading from the privy as well as the bathing place, to what my informant called a jeera; jeera is a name usually applied to a spring of water, but here it means the converse, and is applied to a pit, the equivalent of the *éponge* in the courts or gardens of houses at Marseilles, and too well known in other European and Indian towns.

The water supply of the residents is wholly from tanks. There is a well on the south side of the Gungala tank, which once was in good repute, but now is ruinous, and one beside the Vitoba Muth that is used by the Pundhurpoor pilgrims who lodge there. There are in all eight tanks in and around the village, but only two of them are considered, even by the villagers, to afford good drinking water: they are the Isoba tank at

some distance on the south, and not much used, and the Gungala on the west. The latter is a large tank with stone-lined embankments, and the body of water it holds is abundantly sufficient to maintain its purity under ordinary circumstances, but it is resorted to by nearly all the inhabitants and pilgrims, not merely to draw water from it, but to bathe and wash their clothes in it. It is fed by springs, and its water is never exhausted or even greatly diminished. Its overflow is the beginning of this branch of the Godavery, which, although not the highest or most distant, yet is considered the sacred Gunga. The stream is conducted to the temple of Gunga in the middle of the village, where it feeds a large cut-stone reservoir—the Kooshawurt, which is considered by the Hindoos to be the proper and efficacious sacred bathing place. This reservoir had become very foul, and its water was very nauseous to the pilgrims, who had nevertheless, as a matter of conscience, to drink of it as well as to bathe in it; but it has recently been cleaned at the expense of a first-class Sirdar, who also has given an expensive rath in which to carry the image of Trimbukeshwur.

The waste water and leakage of the Gungala flows through the village in a channel lined with cut-stone masonry, with steps of descent at short intervals. The bed of this nascent Godavery was very foul, and the water, which disappears altogether in the hot season, was already low; the quality of the water may be judged of, when it is stated that pigs and crows were seen feeding in it. The last defilement the Godavery receives before it leaves Trimbuk, is from the ashes of the dead that are thrown into it—the place of cremation and of burial being a short distance below and to the eastward of the town.

In the rains, and for a short while after them, a small stream trickles from one of the numerous perpendicular fissures on the face of the scarp of Trimbuk hill, and flows under a small stone image of the goddess, which stands in a niche, and which is a chief object of worship, although several other idols have likewise their niches in the rock. The great fatigue of the long ascent to this spot is lessened by a well-built stone stair, a work of great magnitude and of recent construction. The stream, even where above the reach of man, is not free from defilement, as monkeys (makur) were seen passing along it. On the top of Neelpurot there is a temple of Bhowanee; and a Bhatie of Bombay has lately devoted, it is said, 14,000 rupees to build a stair or way of ascent for the pilgrims to this temple. There is no periodical Jutra to this Bhowanee.

There is a Jutra in April or May every year to Trimbukeshwur, at which some 4,000 to 6,000 persons assemble. They are in part lodged in the town, but most of them encamp on the ground near the temple, which at any other season would be very objectionable, from its surface being in part broken and hollow, but in the middle of the hot weather this is of less consequence. The pilgrims encamped at this place are far removed from good drinking water, as the large Gotmul tank behind the temple is foul, owing to the surface drainage of the village being allowed to flow into it in the rains.

An endeavour is being made by the Brahmuns of Trimbukeshwur temple, since the new idol car has been received, to establish another annual Jutra, to take place in November; but it is to be hoped, for the sake of the health of the pilgrims, as well as for other reasons, that the attempt will not succeed. The hill-encircled position and the undrained ground of the little valley in which the village lies, is such as may always be considered unhealthy, and experience abundantly proves this to be the case in the instance of Trimbuk. Sick-ness, and especially fever, is very prevalent, and it is much more so at the particular season that has been chosen for the proposed new Jutra than it is at other times.

There is also an annual jutra of the worshippers of Vitoba in January, at which it is said four or five thousand persons congregate. These pilgrims lodge in the Muth beside the Gungala tank, or encamp around it. The ground is generally favourable for the purpose.

The Jutra at which Trimbuk is most largely visited takes place once every 12 years, on the recurrence of the year called singhustha in the Rashee Chukra or zodiacal cycle. The Jutra lasts all that year, but it is said to be most numerously attended in October, which is a very unfavourable month as regards health. The last singhustha corresponded with the year 1861.

Cholera sometimes appears at the Jutra, and then the mortality is very great; it had been absent from Trimbuk for several years, and when it broke out this year the Jutra was over. There were 41 deaths in June and four in July.

There is no municipal corporation in the village, and there is no power to raise funds for conservancy purposes.

Excepting what the police do in ordering the removal of obstructions on the road and preventing any gross interference with public convenience, there is, so far as I could learn, no authority exercised regarding nuisances.

It is very desirable that the Municipal Act should be adopted here, and that power should be possessed to make the pilgrims contribute towards the funds required for sanitary improvements, as it is for their welfare as well as for that of the villagers that they are needed. In this and in similar instances, should the inhabitants be backward in taking advantage of the Act, there seems reason that they should by constraint be placed under it.

The improvements that are most urgently required are, that the water of the Gungala tank, on which most of the residents and very many visitors depend for drinking water, be guarded from pollution. This might be effected at little expense, merely by placing policemen to prevent the people from bathing and washing their clothes in the tank, and by affording them facility for doing so on the outer slope of its bank, where troughs should be

be placed, as described in the Report on Sholapoor, for their convenience, and a trench should be made to drain away the waste washing water.

The lanes in the village should be laid with stone; rubble would be sufficient for the purpose.

The surface drainage of the village, instead of being allowed to flow to the Gotmul tank, should be diverted elsewhere, which it is thought would be easily effected.

The use of the jeera, or absorbent pit, should be prohibited in the village, and the use of vessels, in which the filth may be carried away, should be introduced.

The swampy parts of the valley should be trenched and drained, and the encamping ground beside Trimbukeshwur temple should be improved.

At the time of a Jutra, a strict conservancy police should be employed to maintain cleanliness on and near the encampments.

(signed) *A. H. Leith.*

R E P O R T
OF THE
SANITARY COMMISSION FOR
BOMBAY,
1865.

(Presented to Parliament by Her Majesty's Command.)

*Ordered, by The House of Commons, to be Printed,
1 August 1866.*

[Price 1 s. 2 d.]

EAST INDIA (CHINCHONA PLANT).

RETURN to an Address of the Honourable The House of Commons,
dated 14 May 1866;—*for*,

“ COPY of further CORRESPONDENCE relating to the Introduction of the
CHINCHONA PLANT into *India*, and to Proceedings connected with its
Cultivation, from April 1863 to April 1866.”

India Office, }
June 1866. }

E. D. BOURDILLON,
Secretary in the Public Department.

(*Mr. Ewart.*)

Ordered, by The House of Commons, to be Printed,
18 June 1866.

C O N T E N T S.

— I. —

CHINCHONA CULTIVATION ON THE NEILGHERY HILLS.

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COPY of further CORRESPONDENCE relating to the Introduction of the CHINCHONA PLANT into *India*, and to Proceedings connected with its Cultivation, from April 1863 to April 1866.

— I. —

CHINCHONA CULTIVATION ON THE NEILGHERRY HILLS.

— No. 1. —

From the Madras Government to the Secretary of State for India.

Madras, 11 April 1863.

WITH reference to your despatch, dated 16th January 1863, No. 2, we have the honour to advise you of the transmission by this Mail of specimens of Chinchona bark, &c., as per accompanying list, and to request that they may be submitted to Mr. Howard for analysis and report. Mr. McIvor's letter, dated 4th April 1863, copy of which is also transmitted, gives a full description of the several specimens.

Proceedings, dated
5 March 1863,
Nos. 55—58.
Proceedings, dated
11 April 1863,
No. 634.

Enclosure in No. 1.

From *W. G. McIvor*, Esq., Superintendent Government Chinchona Plantations, to
J. D. Sim, Esq., Secretary to Government, Revenue Department, Fort Saint George.

Sir,

Ootacamund, 4 April 1863.

1. WITH reference to the Order of Government of the 5th March 1863, No. 471, and the Despatch from the Right Honourable Sir Charles Wood, dated 16th January 1863, No. 2, I have the honour to forward for transmission to Her Majesty's Secretary of State for India, specimens of Chinchona bark and wood, also dried leaves, decoction and infusion made from the same (as per list annexed), in order that they may be submitted to Mr. Howard for analysis and report. The specimens embrace the bark in all stages of growth from one month up to 15, and it is possible they may enable that eminent chemist to trace the earliest stage in which alkaloids begin to form, and thus throw much light upon the practical advantage or otherwise likely to be derived from our proposed system of lopping and pruning.

2. The barks were, in the first instance, dried upon warm iron plates; the process of drying being completed by exposure to the sun. During a portion of the time the barks were exposed to the sun, the atmosphere was very dry, indicating as much as 10° Fahr. between the wet and dry bulb thermometers.

3. The leaves in specimen No. 8 were dried in the sun under the same circumstances as the bark, while the leaves of specimen No. 9 were dried in the shade; and as they seem to have retained more of their virtue, it occurs to me that the bark should also have been dried in the shade, and I would respectfully solicit Mr. Howard's opinion on this point.

4. Specimens Nos. 10 and 11 of decoction and infusion made from the green leaves, immediately they were gathered from the plants, are submitted, as Mr. Howard from his great practical experience may be able to form a more correct opinion of their virtue than could be obtained in this country. At the same time we have submitted both decoction and infusion, as well as the leaves themselves, to the Principal Inspector

General Medical Department, Madras, as also to the senior medical officer of this station, for trial in the hospital here.

5. We have ascertained that the Chinchona tree has the power of rapidly renewing its bark, if the spaces from which it is taken are immediately covered with damp moss. Specimen No. 3 is the new bark formed over the same spaces from which the barks sent through Mr. Markham to Mr. Howard in July last were taken; this bark is consequently of eight months' growth, and is much thicker in proportion than bark of the same age formed on young wood. The object in submitting this small specimen of renewed bark is to ascertain whether bark so found is likely to prove of as much commercial value as that formed in the usual way; should it do so, it will prove of immense practical value, inasmuch as it will enable us to remove stripes of bark from the trunk, perhaps with the greatest advantage after a growth of from six to seven years, at the same time immediately covering the spaces with damp moss as the bark is removed; when treated in this manner, new bark will form over the entire surface in from six weeks to two months, when the moss may be taken off; the bark being then capable of performing all its functions without any protection whatever, and, perhaps, should be permitted to attain a growth of six or seven years before the same bark is again removed. Although it is possible, I do not see that any deterioration in the market value of the bark can be caused by this treatment, and should it prove successful it will have the immense advantage of enabling us to procure at least three times the produce of bark which could be had under any other system.

6. When the branch or stem of a Chinchona tree is covered with moss for a few months, the bark increases rapidly in thickness, and, consequently, in weight; the lower portion of specimen No. 4 illustrates the effect produced on the bark when treated in this manner. The object in submitting this specimen is to ascertain if the increased thickness in the bark, and, consequently, the greater cellular development is likely to facilitate the deposit of alkaloids.

7. I fear that the specimens now sent may, perhaps, be too young to enable Mr. Howard to come to a definite conclusion, but I trust they may enable him to indicate the probable future results; and with the permission of Government, I will further prosecute the experiments above noticed, as I consider it desirable not to lose sight of the fact that we are only beginning the cultivation of a plant, the correct treatment of which is but little known. It is therefore important that we endeavour as early as possible to arrive at a system of cultivation which will produce the greatest yield of alkaloids and bark, with the least expenditure of time and capital.

No. 1. Specimens of bark from wood of the preceding year.

No. 2. Bark from wood of current growth.

No. 3. Specimen of bark formed over the spaces from which the bark had been removed in July 1862.

No. 4. Specimen of bark, the lower ends of which have been covered with moss since September 1862, until the date of being removed, 22d March 1863.

No. 5. Specimen of wood and bark of preceding year.

No. 6. Wood of preceding year.

No. 7. Wood and bark of current growth.

No. 8. Old leaves which had fallen spontaneously from the plants dried in the sun.

No. 9. Green leaves gathered from the plants and dried in the shade.

No. 10. Decoction of Chinchona leaves, boiled for half an hour, to which one-third of its bulk of brandy has been added to preserve it.

No. 11. Infusion of Chinchona leaves, to which also one-third of spirit has been added.

— No. 2. —

From the Government of Madras to the Secretary of State for India.

Madras, 13 April 1863.

WE have the honour to forward for your information the accompanying Tabular Report on the number, condition, &c., of the Chinchona plants on the Neilgherries on the 31st March 1863.

Enclosure in No. 2.

From *W. G. McIvor*, Esq., Superintendent Government Chinchona Plantations, to *J. D. Sim*, Esq., Secretary to Government, Revenue Department.

Sir,

Ootacamund, 10 April 1863.

1. WITH reference to the Order of Government of the 22d October 1862, No. 2263, I have the honour to enclose the report for last month of our progress in the Chinchona operations.

2. As an alteration in the nomenclature of the species has been made at the suggestion of Mr. Clements R. Markham, with the concurrence and approval of Sir William and Dr. Hooker, I would respectfully solicit the favour of being furnished with six printed copies of the accompanying report for distribution.

REPORT on the Number, Distribution, and Condition of Chinchona Plants on the Neilgherries, on
31 March 1863.

No. of Species.	Botanical Names.	Commercial Names.	Number of Plants.	Value per Lb. of Dry Bark in the London Market.	REMARKS.
				<i>s. d.</i> <i>s. d.</i>	
1	<i>C. succirubra</i> - -	Red Bark - -	51,643	2 6 to 8 9	The weather being favourable, the first planting operations of this season was commenced towards the end of the month. The number of plants planted being 750; thus making the total number of plants permanently placed out in the plantations 35,750. The growing season having fairly set in, these plants are making rapid growth. The increase by propagation during last month is 10,809, or about 1,500 under the average of the last six months.
2	<i>C. Calisaya</i> - -	Yellow Bark - -	1,540	2 10 to 7 -	
3	<i>C. officinalis</i> , var. <i>Condaminea</i> (<i>C. Uritus</i> singa Howard).	Original Loxa Bark	969	2 10 to 7 -	
4	<i>C. officinalis</i> , var. <i>Bonplandiana</i> (<i>C. Chahuarguera</i>).	Select Crown Bark -	68,757	2 10 to 7 -	
5	<i>C. crespilla</i> - -	Fine Crown Bark -	903	2 10 to 6 -	
6	<i>C. lancifolia</i> - -	Pitayo Bark - -	1	1 8 to 2 10	
7	<i>C. nitida</i> - -	Genuine Grey Bark -	8,326	1 8 to 2 9	
8	<i>C. Species</i> without name.	Fine Grey Bark -	2,623	1 8 to 2 10	
9	<i>C. micrantha</i> - -	Grey Bark - -	8,424	1 8 to 2 9	
10	<i>C. Peruviana</i> - -	Finest Grey Bark -	2,937	1 8 to 2 10	
11	<i>C. Pahudiana</i> - -	Unknown - -	425	Worthless.	
TOTAL Number of Plants - - -			146,548		

TABLE II.

MEMORANDUM of the Growth of Eleven Plants of *C. succirubra*, planted in the Second Denison Plantation, at *Neddivuttum*, on 30 August 1862.

Number of Plants.	Height in Inches when Planted, 30 August 1862.	Height in Inches on 28 February 1863.	Height in Inches on 31 March 1863.	Growth in Inches during March 1863.	By Whom Planted.
1	23	48	53	5	His Excellency Sir W. Denison.
2	16½	44	48	4	
3	19	41	46	5	
4	15	43	47	4	
5	27	54	58	4	
6	20	43½	46	2½	J. W. Breeks, Esq. Dr. Sanderson. J. D. Sim, Esq. Lieutenant McLeod. P. Grant, Esq.
7	20	44½	48	3½	
8	18	44	48	4	
9	20	42	49	7	
10	20	51	56	5	
11	18	52	55	3	

TABLE II. exhibits the growth of 11 plants planted out by his Excellency the Governor and other gentlemen, on the 30th August 1862. The average growth of these plants during last month being 4½ inches, or 1½ inch greater than the growth in February.

TABLE III.
MEMORANDUM of Chinchona Plants Distributed.

NAMES.	STATION.	Number of Plants.	REMARKS.
Mr. F. N. Maltby - - -	Travancore - -	16	TABLE III. shows the number of plants sold or otherwise disposed of, and the localities to which they have been sent; while
Dr. Junghuhn - - -	Java - - -	56	
Mr. A. R. Lascelles - - -	Ootacamund - -	12	
Mr. M. Anderson - - -	Jamaica - - -	2	
Dr. Wiehe - - -	Bombay - - -	10	
Dr. T. Anderson - - -	Calcutta - - -	554	
Dr. Jamieson - - -	Saharanpore - -	107	
Professor Lees - - -	Calcutta - - -	61	
Rajah of Travancore - - -	Travancore - -	521	
Major Morgan - - -	Ootacamund - -	19	
E. T. Fitzgerald - - -	Calcutta - - -	261	
TOTAL - - -		1,619	

TABLE IV.
REGISTER of Applications for Chinchona Plants in 1863-64.

NAMES.	STATION.	Number of Plants.
Mr. G. Dawson - - -	Ootacamund - -	1,000
Mr. J. Chesson - - -	Mahableshtar - -	500
Mr. W. Chambers - - -	Ootacamund - -	1,000
Mr. A. R. Lascelles - - -	ditto - - -	10,000
Mr. T. De Facien - - -	Katarey - - -	5,000
Mr. G. Vincent - - -	ditto - - -	5,000
Mr. J. Pierie - - -	Calicut - - -	2,000
Mr. E. B. Thomas - - -	England - - -	500
Mr. G. Stainbank - - -	Katarey - - -	1,000
Mr. J. H. Schnarrie - - -	Ootacamund - -	5,000
Mr. G. Southy - - -	Walghat - - -	1,700
Major Morgan - - -	Ootacamund - -	1,000
Captain R. N. Taylor and Heads of Families at Coorg - - -	Coorg - - -	5,000
Superintendent of Astragam - - -	Mysore - - -	5,000
Mr. J. Knopp - - -	Ootacamund - -	100
Mr. T. Rayne - - -	Manantoddy - -	—
Captain T. H. Godfrey - - -	Ootacamund - -	100
Mr. P. Grant - - -	Coimbatore - -	100
TOTAL - - -		44,000

TABLE IV. exhibits the register of applicants for Chinchona plants, for public companies and private cultivation.

The number of plants already bespoken amounts to 44,000; and when it is remembered that no public advertisement has been made of the intention of the Government to dispose of the plants, this fact clearly establishes that Chinchona cultivation will be extensively taken up by private enterprise. At the suggestion of Mr. C. R. Markham, the names of some of our species have been altered in this report; that gentleman's Memorandum on the subject is hereto attached, for the information of all who are interested in the nomenclature of the species.

Government Gardens, Ootacamund,
10 April 1863.

(signed) W. G. McIvor,
Superintendent, Government Chinchona Plantations.

MEMORANDUM.

There has been much confusion in the nomenclature of the species of Chinchona from the forests of Loxa, three varieties of which are now growing on the Neilgherry Hills. They are all classed by Dr. Weddell under the head of *C. Condaminea*; and hitherto the varieties have been called in Mr. Melvor's Reports, 1. *Uritusinga*; 2. *Chahuarguera*; 3. *Crispa*.

Dr. Hooker, in a recent number of the "Botanical Magazine," has named the species *C. officinalis*, reverting to the original name given by Linnæus (see page 9 of "Travels in Peru and India"). Dr. Hooker says, "When once the law of priority is departed from without perfectly good cause, the door is opened to endless future change and consequent confusion. The genus was founded upon the one plant called 'suinquina' by La Condamine, to which Linnæus gave the specific name of *C. officinalis*. This name, which appears to us in every way unobjectionable, and which was adopted by Vahl and Lambert, Willdenow, Lamarck, and Ræmer and Schultes, was changed by Humboldt and Bonpland to *C. Condaminea*, on grounds which we consider insufficient."

It is, therefore, proposed that the name *C. officinalis* should be adopted for this species now thriving in India, out of deference to the opinion of so high an authority on systematic botany as Dr. Hooker.

With regard to the three varieties of this species now growing on the Neilgherry Hills, it is proposed to adopt the following names, with the concurrence of Sir William and Dr. Hooker:—

(1.) That now called *Uritusinga* was the original variety discovered by La Condamine, and should therefore bear his name, Var. *Condaminea*.

(2.) That now called *Chahuarguera* is the identical plant figured in Plate X. of the great work of Humboldt and Bonpland (the unshaded branch with capsules). It ought, therefore, to bear the name of one or other of those eminent naturalists. A species of chinchona has already been called after Humboldt, and it is therefore proposed to call this variety *Bonplandiana*.

(3.) The variety called *Crispa* by Tafalla requires no alteration.

We thus have *C. officinalis*, 1. Var. *Condaminea*.

2. Var. *Bonplandiana*.

3. Var. *crispa*.

18 February 1863.

(signed) Clements R. Markham.

— No. 3. —

From the Government of Madras to the Secretary of State for India.

Madras, 13 May 1863.

WE have the honour to forward, for your information, the accompanying Tabular Report on the number, condition, &c. of the Chinchona plants on the Neilgherries on the 30th April 1863.

Enclosure in No. 3.

From *W. G. McIvor*, Esq., Superintendent Government Chinchona Plantations, to
J. D. Sim, Esq., Secretary to Government, Revenue Department.

Sir,
 Ootacamund, 9 May 1863.
 WITH reference to the Order of Government of the 22d October 1862, No. 2263,
 I have the honour to enclose the Report for last month of our progress in the Chinchona
 operations.

REPORT on the Number, Distribution, and Condition of Chinchona Plants on the Neilgherries, on
 30 April 1863.

No. of Species.	Botanical Names.	Commercial Names.	Number of Plants.	Value per Lb. of Dry Bark in the London Market.	REMARKS.
1	<i>C. succirubra</i> - -	Red Bark - -	53,854	<i>s. d.</i> 2 6 to 8 9	The number of plants planted out during last month being 5,647, making a total of 41,397, permanently planted out in the plantations.
2	<i>C. Calisaya</i> - -	Yellow Bark - -	1,587	2 10 to 7 -	
3	<i>C. officinalis</i> , var. <i>Condaminea</i> (<i>C. Uritus</i> ingia Howard).	Original Loxa Bark	1,051	2 10 to 7 -	
4	<i>C. officinalis</i> , var. <i>Bonplandiana</i> (<i>C. Chahuarguera</i>).	Select Crown Bark -	77,322	2 10 to 7 -	The increase by propagation during the month is 12,565, which is over the average results of the last six months.
5	<i>C. crespilla</i> - -	Fine Crown Bark -	1,003	2 10 to 6 -	
6	<i>C. lancifolia</i> - -	Pitayo Bark - -	1	1 8 to 2 10	
7	<i>C. nitida</i> - -	Genuine Grey Bark -	8,345	1 8 to 2 9	
8	<i>C. Species</i> without name.	Fine Grey Bark -	2,638	1 8 to 2 10	
9	<i>C. micrantha</i> - -	Grey Bark - -	8,517	1 8 to 2 9	
10	<i>C. Peruviana</i> - -	Finest Grey Bark -	2,961	1 8 to 2 10	
11	<i>C. Pahudiana</i> - -	Unknown - -	425	Worthless.	
TOTAL Number of Plants - - -			157,704		

TABLE II.

MEMORANDUM of the Growth of 11 Plants of *C. succirubra*, Planted on the Second Denison Plantation, at *Neddivuttum*, on 30 August 1862.

Number of Plants.	Height in Inches when Planted, 30 August 1862.	Height in Inches on 31 March 1863.	Height in Inches on 30 April 1863.	Growth in Inches during April 1863.	By Whom Planted.
1	23	53	60	7	His Excellency Sir W. Denison.
2	16½	48	55	7	
3	19	46	51	5	
4	15	47	53	6	J. W. Breeks, Esq. Dr. Sanderson. J. D. Sim, Esq. Lieutenant McLeod. P. Grant, Esq.
5	27	58	64	6	
6	20	46	51	5	
7	20	48	53	5	
8	18	48	54	6	
9	20	49	54	5	
10	20	56	64	8	
11	18	55	60	5	

Table II. exhibits the growth of 11 plants planted out by His Excellency the Governor and other gentlemen on the 30th August 1862. The average growth of these plants during the month being 5½ths of an inch, or nearly 1½ inches greater than the growth in March.

TABLE III.

MEMORANDUM of the Height of 60 Plants, Planted below the Nursery on the Second Denison Plantation, on 18 September 1862, Average Height of the Plants at the time of Planting being 12 Inches.

No.	Ins.	No.	Ins.	No.	Ins.	No.	Ins.	No.	Ins.	REMARKS.
1	54	13	52	25	36	37	49	49	48	Table III. exhibits the growth of 60 plants measured without selection from one side of the plantation. This Table has been introduced in order to give a general idea of the growth of the plants as compared with the 11 selected plants given in the above Table. The growth of these 60 plants gives an average in 7 months and 12 days of 37 inches, while the 11 selected plants only gives an average growth in the same period of 30½ inches. The height of the largest plant on the 30th was 7 feet 6 inches, with branches from 3 to 5½ feet in length, the circumference of the stem being 6½ inches, measured at half a foot above the surface of the ground.
2	51	14	51	26	40	38	54	50	40	
3	43	15	50	27	50	39	53	51	44	
4	54	16	51	28	54	40	43	52	48	
5	50	17	48	29	48	41	50	53	43	
6	50	18	50	30	54	42	48	54	44	
7	48	19	52	31	46	43	43	55	45	
8	48	20	58	32	54	44	48	56	48	
9	44	21	52	33	54	45	48	57	48	
10	52	22	51	34	53	46	48	58	55	
11	50	23	50	35	60	47	55	59	45	
12	50	24	48	36	51	48	51	60	50	

TABLE IV.

MEMORANDUM of Chinchona Plants Distributed.

NAMES.	STATION.	Number of Plants.
Mr. F. N. Maltby - - -	Travancore - - -	16
Dr. Junghuhn - - -	Java - - -	56
Mr. A. R. Lascelles - - -	Ootacamund - - -	12
Mr. M. Anderson - - -	Jamaica - - -	2
Dr. Wiehe - - -	Bombay - - -	10
Dr. T. Anderson - - -	Calcutta - - -	554
Dr. Jamieson - - -	Saharanpore - - -	107
Professor Lees - - -	Calcutta - - -	61
Rajah of Travancore - - -	Travancore - - -	521
Major Morgan - - -	Ootacamund - - -	19
Mr. E. T. Fitzgerald - - -	Calcutta - - -	261
Mr. J. W. B. Money - - -	ditto - - -	581
Dr. W. Browne - - -	ditto - - -	420
Mr. Cox - - -	Wainad - - -	6
Mrs. Hollock - - -	ditto - - -	2
TOTAL - - -		2,628

TABLE V.

REGISTER of Applications for Chinchona Plants in 1863-64.

NAMES.	STATION.	Number of Plants.
Mr. G. Dawson - - -	Ootacamund - - -	1,000
Mr. J. Cheeson - - -	Mahableshwar - - -	500
Mr. W. Chambers - - -	Ootacamund - - -	1,000
Mr. A. R. Lascelles - - -	ditto - - -	10,000
Mr. T. DeFacion - - -	Katarey - - -	5,000
Mr. G. Vincent - - -	ditto - - -	5,000
Mr. J. Pierie - - -	Calicut - - -	2,000
Mr. E. B. Thomas - - -	England - - -	500
Mr. G. Stainbank - - -	Katarey - - -	1,000
Mr. G. H. Schnarrie - - -	Ootacamund - - -	5,000
Mr. G. Southy - - -	Walghat - - -	1,700
Major Morgan - - -	Ootacamund - - -	1,000
Captain R. N. Taylor and heads of families at Coorg - - -	Coorg - - -	5,000
Superintendent of Astagram Division	Mysore - - -	5,000
Mr. J. Knop - - -	Ootacamund - - -	100
Mr. W. T. Rayne - - -	Manantoddy - - -	—
Captain T. H. Godfrey - - -	Ootacamund - - -	100
Mr. P. Grant - - -	Coimbatore - - -	100
Dr. A. E. M. Ross - - -	Honore - - -	200
Major C. P. Taylor - - -	Ootacamund - - -	500
Colonel Faber - - -	ditto - - -	50
Mr. S. James - - -	ditto - - -	200
TOTAL - - -		44,950

Government Gardens, Ootacamund,
9 May 1863.

(signed) W. G. McIvor,
Superintendent Government Chinchona Plantations.

— No. 4. —

From Sir *Charles Wood* to the Government of Madras.

India Office, London, 16 July 1863.

Para 1. I HAVE considered in Council your letters in the Revenue Department, dated December 19th, No. 90 of 1862, January 10th, No. 2, February 11th, No. 11, March 11th, No. 20, April 11th, No. 29, April 13th, No. 30, and May 13th, No. 43, of 1863, reporting the progress of Chinchona cultivation on the Neilgherry Hills; and observe, with much satisfaction, that the plants have continued to thrive and increase in numbers during the cold dry weather of the winter months. Much credit is due to Mr. M'Ivor for the zeal and ability with which he has conducted this experiment, and for the great success which has already been attained; and the correctness of the system of cultivation recommended by Mr. Markham, which has been so steadily persevered in by Mr. M'Ivor, is now placed beyond doubt by the results of Mr. Howard's analysis.

2. The specimens of Chinchona bark and leaves which were forwarded with your letter dated 11th April (No. 29) 1863, have been referred to Mr. Howard for analysis, and I now transmit 50 copies of his report. You will observe that the young bark grown in India has yielded as large a per-centage of quinine as is usually obtained from the mature bark of the same species received from South America; and this result, which is as satisfactory as it is unexpected, will, probably, have the effect of increasing the demand for plants in India.

3. Mr. M'Ivor's attention should now be directed to the best method of drying the bark, to the discovery of the most advantageous time for cutting it, and to the best conditions for increasing its thickness and its yield of alkaloids. With this view, further supplies of bark should be sent home from time to time, in order that cultivators in India may have the advantage of Mr. Howard's observations on these points; and careful meteorological observations should be kept in the Chinchona plantations. I have given directions for a supply of the necessary instruments to be forwarded to Mr. M'Ivor with as little delay as possible.

4. There seems to be every reason to expect that Chinchona cultivation will be very extensively undertaken by private enterprise in the various hill districts of India; and the valuable and interesting manual of instructions drawn up by Mr. M'Ivor, which you have caused to be published, is likely to be of great service to cultivators. Many applications have already been made for plants, and I have noted with special pleasure that the heads of native families in Coorg are among the applicants. Not the least advantage which will be derived from this important experiment is, that the use of quinine will be extended to the natives; and the discovery that the leaves, as well as the bark, yield febrifuge alkaloids, will bring the healing virtues of quinine within the reach of the poorest labourer.

5. I have received reliable information that there has recently been a great and general deterioration of the quality of Peruvian bark received from South America, and, while informing you of this fact, I feel it to be unnecessary to urge upon you the incalculable importance of the success of chinchona cultivation in India, not only to that country, but to the whole civilized world.

I have, &c.
(signed) *C. Wood.*

— No. 5. —

From the Government of Madras to the Secretary of State for India.

Madras, 16 June 1863.

WE have the honour to forward, for your information, the accompanying Tabular Report on the number, condition, &c. of the Chinchona plants on the Neilgherries, on the 31st May 1863.

Enclosure in No. 5.

From *W. G. McIvor*, Esq., Superintendent Government Chinchona Plantations, to
J. D. Sim, Esq., Secretary to Government, Revenue Department.

Sir,
Ootacamund, 11 June 1863.
WITH reference to the Order of Government of the 22d October 1862, No. 2263,
I have the honour to enclose the Report for last month of our progress in the Chinchona
operations.

REPORT on the Number, Distribution, and Condition of Chinchona Plants on the Neilgherries, on
the 31 May 1863.

No. of Species.	Botanical Names.	Commercial Names.	Number of Plants.	Value per Lb. of Dry Bark in the London Market.		REMARKS.
				<i>s.</i>	<i>d.</i>	
1	<i>C. succirubra</i> - -	Red Bark - -	56,385	2	6 to 8	I am happy to be able to state that two of the largest of our Chinchona plants are producing flower spikes, and no doubt many more will shortly do the same; we may therefore anticipate an early supply of seeds.
2	<i>C. Calisaya</i> - -	Yellow Bark - -	1,607	2	10 to 7	
3	<i>C. officinalis</i> , var. <i>Condaminea</i> (<i>C. Uritus</i> - <i>singa Howard.</i>)	Original Loxa Bark	1,103	2	10 to 7	
4	<i>C. officinalis</i> , var. <i>Bonplandiana</i> (<i>C. Chahuarguera</i>).	Select Crown Bark -	84,050	2	10 to 7	The number of plants planted out during the month is 1,631, making a total of 43,028 permanently planted out in the plantations; all of these are making satisfactory progress.
5	<i>C. crespilla</i> - -	Fine Crown Bark -	1,056	2	10 to 6	
6	<i>C. lancifolia</i> - -	Pitayo Bark - -	4	1	8 to 2	
7	<i>C. nitida</i> - -	Genuine Grey Bark	8,358	1	8 to 2	The increase by propagation during the month is 9,632, being 1,183 under the average results of the last six months.
8	<i>C. Species</i> without name.	Fine Grey Bark -	2,654	1	8 to 2	
9	<i>C. micrantha</i> - -	Grey Bark - -	8,584	1	8 to 2	
10	<i>C. Peruviana</i> - -	Finest Grey Bark -	2,989	1	8 to 2	Worthless.
11	<i>C. Pahudiana</i> - -	Unknown - -	425			
TOTAL Number of Plants - - -			167,215			

TABLE II.

MEMORANDUM of the Growth of Eleven Plants of *C. succirubra*, planted on the Second Denison Plantation at Neddivuttum, on 30 August 1862.

Number of Plants.	Height in Inches when Planted, 30 August 1862.	Height in Inches on 30 April 1863.	Height in Inches on 31 May 1863.	Growth in Inches during May 1863.	By whom Planted.
1	23	60	65	5	His Excellency Sir W. Denison.
2	16½	55	60	5	
3	19	51	58	7	
4	15	53	58	5	
5	27	64	71	7	
6	20	51	55	4	J. W. Brecks, Esq. Dr. Sanderson. J. D. Sim, Esq. Lieutenant McLeod. P. Grant, Esq.
7	20	53	60	7	
8	18	54	61	7	
9	20	54	58	4	
10	20	64	70	6	
11	18	60	65	5	

TABLE II. exhibits the growth of 11 plants planted out by his Excellency the Governor, and other gentlemen, on the 30th August 1862. The average growth of these plants during the month is 5 7/11ths of an inch, or about 3/11ths of an inch less than the growth in April.

TABLE III.
MEMORANDUM of Plants distributed.

NAMES.	STATIONS.	Number of Plants.	REMARKS.
Mr. F. N. Maltby - - -	Travancore - - -	16	The number of plants distributed to the public during the month is 124; the additional plants registered for distribution being 16,300.
Dr. Junghuhn - - -	Java - - -	56	
Mr. A. R. Lascelles - - -	Ootacamund - - -	12	
Mr. M. Anderson - - -	Jamaica - - -	2	
Dr. Wiehe - - -	Bombay - - -	10	
Dr. T. Anderson - - -	Calcutta - - -	554	
Dr. Jamieson - - -	Saharanpore - - -	107	
Professor Lees - - -	Calcutta - - -	61	
Rajah of Travancore - - -	Travancore - - -	521	
Major Morgan - - -	Ootacamund - - -	19	
Mr. E. T. Fitzgerald - - -	Calcutta - - -	261	
Mr. J. W. Money - - -	ditto - - -	581	
Dr. W. Bourne - - -	ditto - - -	420	
Captain Cox - - -	Wainad - - -	6	
Mrs. Hollock - - -	ditto - - -	2	
Mr. T. Sheffield - - -	Ootacamund - - -	12	
Dr. F. Day - - -	Cochin - - -	100	
Mr. Brown - - -	Tellicherry - - -	12	
TOTAL - - -		2,752	

TABLE IV.
REGISTER of Applications for Chinchona Plants in 1863-64.

NAMES.	STATIONS.	Number of Plants.
Mr. G. Dawson - - -	Ootacamund - - -	1,000
Mr. J. Chesson - - -	Mahableshtar - - -	500
Mr. W. Chambers - - -	Ootacamund - - -	1,000
Mr. A. R. Lascelles - - -	ditto - - -	10,000
Mr. T. De Facien - - -	Kartairy - - -	5,000
Mr. G. Vincent - - -	ditto - - -	5,000
Mr. J. Pierie - - -	Calicut - - -	2,000
Mr. E. B. Thomas - - -	England - - -	500
Mr. G. Stainbank - - -	Kartiry - - -	1,000
Mr. J. H. Schnarrie - - -	Ootacamund - - -	5,000
Mr. G. Southey - - -	Walghat - - -	1,700
Major Morgan - - -	Ootacamund - - -	1,000
Captain R. N. Taylor and heads of families at Coorg - - -	Coorg - - -	5,000
Superintendent Astagram Division - - -	Mysore - - -	5,000
Mr. J. Knop - - -	Ootacamund - - -	100
Mr. W. T. Rayne - - -	Manantoddy - - -	400
Captain T. H. Godfrey - - -	Ootacamund - - -	100
Mr. P. Grant - - -	Coimbatore - - -	100
Dr. A. E. Ross - - -	Honore - - -	200
Major C. P. Taylor - - -	Ootacamund - - -	500
Colonel Faber - - -	ditto - - -	50
Mr. S. James - - -	ditto - - -	200
Major Hodgson - - -	ditto - - -	200
Dr. F. Day - - -	Cochin - - -	5,000
Colonel S. P. Scott - - -	Meyloor - - -	5,000
Major C. M. Fitzgerald - - -	Calcutta - - -	1,000
Lieutenant C. J. Jennings - - -	Ootacamund - - -	2,000
Captain Cox - - -	Wainad - - -	200
Dr. Macnamara - - -	Bengal - - -	1,000
Mr. G. Hurst - - -	Darjeeling - - -	1,000
Mr. Hall - - -	Mahableshtar - - -	500
TOTAL - - -		61,250

Government Gardens, Ootacamund,
11 June 1863.

(signed) *W. G. McIvor*,
Superintendent Government Chinchona Plantations.

— No. 6. —

From the Government of Madras to the Secretary of State for India.

Madras, 13 July 1863.

WE have the honour to forward, for your information, the accompanying Tabular Report, on the number, condition, &c., of the chinchona plants on the Neilgherries, on the 30th June 1863.

Enclosure, in No 6.

From *W. G. McIvor*, Esq., Superintendent to Government Chinchona Plantations, to
J. D. Sim, Esq., Secretary to Government, Revenue Department, Fort St. George.

Sir,

Ootacamund, 10 July 1863.

1. WITH reference to the Order of Government of the 22d October 1862, No. 2,263, I have the honour to enclose the report for last month of our progress in the chinchona operations, to which is appended further information with reference to the analysis of bark forwarded to the Secretary of State in April last.

2. I would respectfully solicit the favour of being furnished with copies of the monthly reports on the progress of chinchona cultivation at Darjeeling, as also in the North West Provinces, if such are furnished to Government.

REPORT on the Number, Distribution, and Condition of Chinchona Plants on the Neilgherries, on the 30 June 1863.

No. of Species.	Botanical Names.	Commercial Names.	Number of Plants.	Value per Lb. of Dry Bark in the London Market.	REMARKS.
1	<i>C. succirubra</i> - -	Red Bark - -	60,365	<i>s. d.</i> 2 6 to 8 9	The panicles of the <i>Chinchona succirubra</i>, which has produced flowering branches, make satisfactory progress. The number of plants planted out during the month is 15,413, making a total of 58,441 permanently planted out in the plantations, all of which are in a very thriving condition. The increase by propagation, during the month, is 14,483, or 4,893 plants above the average of the last six months.
2	<i>C. Calisaya</i> - -	Yellow Bark - -	1,571	2 10 to 7 -	
3	<i>C. officinalis</i> , var. <i>Condaminea</i> (<i>C. Uritus</i> ing Howard).	Original Loxa Bark	1,197	2 10 to 7 -	
4	<i>C. officinalis</i> , var. <i>Bonplandiana</i> (<i>C. Chahuarguera</i>).	Select Crown Bark -	94,050	2 10 to 7 -	
5	<i>C. crespilla</i> - -	Fine Crown Bark -	1,085	2 10 to 6 -	
6	<i>C. lancifolia</i> - -	Pitayo Bark - -	4	1 8 to 2 10	
7	<i>C. nitida</i> - -	Genuine Grey Bark	8,380	1 8 to 2 9	
8	<i>C. Species</i> without name.	Fine Grey Bark -	2,681	1 8 to 2 10	
9	<i>C. micrantha</i> - -	Grey Bark - -	8,738	1 8 to 2 9	
10	<i>C. Peruviana</i> - -	Finest Grey Bark -	3,038	1 8 to 2 10	
11	<i>C. Pahudiana</i> - -	Unknown - -	425	Worthless.	
TOTAL Number of Plants - - -			181,534		

TABLE II.

MEMORANDUM of the Growth of Eleven Plants of *C. succirubra*, planted in the Second Denison Plantation, at Neddivuttum, on 30 August 1862.

Number of Plants.	Height in Inches when Planted, 30 August 1862.	Height in Inches on 31 May 1863.	Height in Inches on 30 June 1863.	Growth in Inches during June 1863.	By Whom Planted.
1	23	65	70	5	His Excellency Sir W. Denison.
2	16½	60	67	7	
3	19	58	64	6	
4	15	58	66	8	
5	27	71	78	7	
6	20	55	58	3	J. W. Brecks, Esq. Dr. Sanderson. J. D. Sim, Esq. Lientenant McLeod. P. Grant, Esq.
7	20	60	66	6	
8	18	61	68	7	
9	20	58	66	8	
10	20	70	78	8	
11	18	65	68	3	

TABLE II. exhibits the growth of 11 plants planted by his Excellency the Governor, and other gentlemen, on the 30th August 1862. The average growth of these plants during the month is $6\frac{2}{11}$ ths inches, or about $\frac{6}{11}$ ths of an inch above the growth in May.

TABLE III.
MEMORANDUM of Chinchona Plants distributed.

NAMES.	STATIONS.	Number of Plants.	REMARKS.
Mr. F. N. Maltby - - -	Travancore - -	16	The number of plants distributed to the public during the month is 144.
Dr. Junghuhn - - -	Java - - -	56	
Mr. A. R. Lascelles - - -	Ootacamund - -	12	
Mr. M. Anderson - - -	Jamaica - - -	2	
Dr. Wiehe - - -	Bombay - - -	10	The additional plants registered for distribution being 5,000.
Dr. T. Anderson - - -	Calcutta - - -	554	
Dr. Jamieson - - -	Saharanpore - -	107	
Professor Lees - - -	Calcutta - - -	61	
Rajah of Travancore - - -	Travancore - -	521	
Major Morgan - - -	Ootacamund - -	39	
Mr. E. T. Fitzgerald - - -	Calcutta - - -	261	
Mr. J. W. Money - - -	ditto - - -	581	
Dr. W. Bourne - - -	ditto - - -	420	
Captain Cox - - -	Wainad - - -	6	
Mrs. Hollock - - -	ditto - - -	2	
Mr. T. Sheffield - - -	Ootacamund - -	12	
Dr. F. Day - - -	Cochin - - -	100	
Mr. Brown - - -	Tellicherry - -	12	
Mr. J. Hall - - -	Ootacamund - -	144	
TOTAL - - -		2,916	

TABLE IV.
REGISTER of Applications for Chinchona Plants in 1863-64.

NAMES.	STATIONS.	Number of Plants.
Mr. G. Dawson - - -	Ootacamund - -	1,000
Mr. J. Chesson - - -	Mahableshtar - -	500
Mr. W. Chambers - - -	Ootacamund - -	1,000
Mr. A. R. Lascelles - - -	ditto - - -	10,000
Mr. T. DeFacien - - -	Kartaury - - -	5,000
Mr. G. Vincent - - -	ditto - - -	5,000
Mr. J. Pierie - - -	Calicut - - -	2,000
Mr. E. B. Thomas - - -	England - - -	500
Mr. G. Stainbank - - -	Kartaury - - -	1,000
Mr. J. H. Schnarrie - - -	Ootacamund - -	5,000
Mr. G. Southey - - -	Walghat - - -	1,700
Major Morgan - - -	Ootacamund - -	1,000
Captain R. N. Taylor and heads of families at Coorg - - -	Coorg - - -	5,000
Superintendent Astagram Division - -	Mysore - - -	5,000
Mr. J. Knop - - -	Ootacamund - -	100
Mr. W. T. Rayne - - -	Manantoddy - -	400
Captain T. H. Godfrey - - -	Ootacamund - -	100
Mr. P. Grant - - -	Coimbatore - -	100
Dr. A. E. Ross - - -	Honore - - -	200
Major C. P. Taylor - - -	Ootacamund - -	500
Colonel Faber - - -	ditto - - -	50
Mr. S. James - - -	ditto - - -	200
Major Hodgson - - -	ditto - - -	200
Dr. F. Day - - -	Cochin - - -	5,000
Colonel S. P. Scott - - -	Meyloor - - -	5,000
Major C. H. Fitzgerald - - -	Calcutta - - -	1,000
Lieutenant C. J. Jennings - - -	Ootacamund - -	2,000
Captain Cox - - -	Wainad - - -	200
Dr. Macnamara - - -	Bengal - - -	1,000
Mr. G. Hurst - - -	Darjeeling - -	1,000
Mr. Hall - - -	Mahableshtar - -	500
Rev. J. B. Sawyers - - -	Vellore - - -	1,000
Mr. W. Stanes - - -	Coonoor - - -	3,000
Mr. D. Boncot - - -	Cachar - - -	1,000
TOTAL - - -		66,250

Government Gardens, Ootacamund,
11 June 1863.

(signed) W. G. McIvor,
Superintendent Government Chinchona Plantations.

— No. 7. —

From the Government of Madras to the Secretary of State for India.

Madras, 12 August 1863.

1. WE have the honour to forward the accompanying letters from Mr. M'Ivor, Superintendent Chinchona Plantations, with our proceedings thereon, for your information.

2. With the first of these letters, Mr. M'Ivor submitted a report from Mr. Howard, stating that quinine had been obtained from the twigs, &c. sent home by us in April last. Mr. M'Ivor proposed in consequence that the system of planting should be altered, nearly double the number of trees being planted in the same area.

3. We gave Mr. M'Ivor discretionary power to adopt this plan, and seeing that by it the produce of each acre would be nearly double, while private parties were rapidly buying plants, we asked Mr. M'Ivor's opinion as to the expediency of limiting our operations.

4. Mr. M'Ivor's reply has satisfied us that it would not be advisable to reduce the extent of our annual planting, and we have, therefore, desired him to continue to plant 150 acres yearly.

5. We take this opportunity of bringing under your consideration the advantage of manufacturing quinine at Ootacamund from the bark there produced. Independent of our own plantations, there can be little doubt that the chinchona will be extensively grown by private individuals, now that it is proved that early returns may be expected on the outlay incurred. It would be good economy, therefore, to manufacture quinine on the spot, instead of, as at present, having to send the bark to England, and re-importing it as quinine. We would, therefore, suggest for your consideration, the establishment, as soon as our supply of bark is sufficient, of a Government manufactory, to which, when the requirements of Government permit, private individuals might also send their bark; and meanwhile we would recommend that the necessary inquiries be made on the subject.

Enclosure 1, in No. 7.

From *W. G. M'Ivor, Esq.*, Superintendent Government Chinchona Plantations, Ootacamund, to *J. D. Sim, Esq.*, Secretary to Government, Revenue Department, Fort Saint George.

Sir,

Ootacamund, 7 July 1863.

1. It affords me much pleasure to be able to submit, for the information of Government, the enclosed report of the analysis of Chinchona bark, submitted to the Secretary of State by Order of Government, under date 11th April 1863, No. 634.

2. This highly satisfactory report of the early formation of alkaloids would seem to render necessary a change in our present system of cultivation. In order to obtain the greatest possible return, it is no doubt desirable that instead of our plants being planted ten feet apart as at present, the distance should be reduced to eight feet for the red and yellow barks, and six feet for the crown barks; this would enable us at the end of the fifth or sixth year to remove each alternate plant. This operation would give those remaining sufficient space to attain maturity, and yield a large harvest of bark; while the plants by being placed close together will afford each other in the early stages of growth protection from the parching rays of the sun during the dry season, and also from the gales of wind during the monsoon.

3. I would, therefore, propose, with the permission of Government, to follow the close system of planting in future, as it is of great importance to obtain as early a return as possible in a cultivation of this description. This alteration in the system of cultivation will nearly double the number of plants required per acre, and may in consequence for a short time reduce the number of plants available for the public.

Enclosure 2, in No. 7.

From *J. E. Howard, Esq.*, to *C. R. Markham, Esq.*

My dear Sir,

28 May 1863.

1. I HAVE great pleasure in informing you that the result of my examination of the bark of *C. succirubra*, grown in India, is very satisfactory. I have, thus far, only operated upon 500 gr., proceeding cautiously, as the quantity of bark sent is small. I find exactly the same constituents as in South American "red bark," and was able to obtain a first and second crystallisation of very white sulphate of quinine mixed (as is usual when obtained from "red bark") with sulphate of chinchonidine; I have also obtained some chinchonine.

2. This must be considered a very satisfactory and promising result, when the immature age of the bark is considered (viz., two years' growth), and especially when I add that the per centage product of alkaloid appears to me as great as would be met with in South America under the same circumstances.

3. I hope to be prepared shortly to give you more definite information on this point, as well as on others of moment connected with the investigations I am pursuing.

Enclosure 3, in No. 7.

From *W. G. McIvor, Esq.*, Superintendent Government Chinchona Plantations, Ootacamund, to *J. D. Sim, Esq.*, Secretary to Government, Revenue Department, Fort Saint George.

Sir,

Ootacamund, 27 July 1863.

1. IN obedience to the Order of Government of the 21st July 1863, No. 1351, I have the honour to report that I am unable to perceive any advantage likely to be derived by Government, or the community, by limiting the planting of chinchonas to 50 acres per annum instead of 150, especially at this moment, when we are in a position to urge forward our operations not only with a certainty of success, but with the certainty of conferring great public benefit, by shortly placing in the market a supply of a medicine unequalled in its curative properties, at a time when the supply from South America is greatly decreasing. Moreover, we have now gained experience and a knowledge of the cultivation of the plants, and, with this advantage, to hand over the greater number of our plants to the management of an inexperienced public, could not conduce to the progress of the cultivation, but the reverse.

2. The Government have already very liberally met the wishes of the public to a great extent, and at a considerable sacrifice to the progress of our chinchona cultivation. In compliance with the G. O. dated 16th April 1861, No. 855, fully one-half of the seeds we received were distributed to coffee planters and others, who wished to "try and rear them." Not a single plant was reared from these seeds; whereas had they been retained here the plants produced from them and increased by propagation would nearly have doubled our present stock.

3. In addition, upwards of 3,000 plants have already been distributed to the public, and nearly two-thirds of these have been lost; and we would not be justified in expecting a better result until the public acquire a knowledge of the treatment of the plants; this they will be some time in gaining, as there is a tendency to attribute each failure to the plants "being unhealthy," or to "something in the climate," instead of to the generally true cause, viz., a want of knowledge of their management. We have placed the public in possession of all the knowledge we have attained in this respect; yet they have the practice to learn, and before this is accomplished there will be many disappointments and failures. Applications have been registered for 100,000 plants, which I trust to be able to supply in 1864-65, and this number, with those already issued, is certainly sufficient to enable the public to gain experience, when it is considered that we commenced on the 9th May 1861 with only 1,128 plants.

4. The propagation of the plants has always received our greatest attention, being from the first pushed to the greatest extent practicable, but the multiplication of these plants by propagation entirely depends upon the increase of our stock of plants, as there is always a limit to the supply of wood from which to make cuttings, and each plant which is added to our stock consequently adds to the production of wood and to our means of propagation; while, on the contrary, the moment we begin to issue plants extensively to the public, our means of propagation are decreased, as the cuttings produced by the plants issued are lost to us; it is therefore impracticable to increase our propagation, and at the same time extensively distribute our plants to the public.

— No. 8. —

From the Government of Madras to the Secretary of State for India.

15 August 1863.

WE have the honour to forward for your information the accompanying Tabular Report on the Number, Condition, &c., of the Chinchona Plants on the Neilgherries on the 31st July 1863.

Enclosure in No. 8.

From *W. G. McIvor*, Esq., Superintendent Government Chinchona Plantations, Ootacamund, to *J. D. Sim*, Esq., Secretary to Government, Revenue Department, Fort St. George.

(No. 67.)

Sir,

Ootacamund, 11 August 1863.

WITH reference to the Order of Government of the 22d October 1862, No. 2263, I have the honour to enclose the report for last month of our progress in the Chinchona operations.

REPORT on the Number, Distribution, and Condition of Chinchona Plants on the Neilgherries, on the 31 March 1863.

Species.	Botanical Names.	Commercial Names.	Number of Plants.	Value per lb. of Dry Bark in the London Market.	REMARKS.
1	<i>C. succirubra</i> - -	Red Bark - -	65,216	<i>s. d.</i> 2 6 to 8 9	The number of plants planted out during the month is 6,342, making a total of 64,783 permanently planted out in the plantations.
2	<i>C. Calisaya</i> - -	Yellow Bark - -	1,627	2 10 to 7 0	
3	<i>C. officinalis</i> , var. <i>Condaminea</i> (<i>C. Uritus</i> singa Howard).	Original Loxa Bark	1,261	2 10 to 7 0	
4	<i>C. officinalis</i> , var. <i>Bonplandiana</i> (<i>C. Chahuarguera</i>).	Select Crown Bark -	104,871	2 10 to 7 0	All the plants in the open ground are making very satisfactory progress, while the plants which are planted under the shade of living trees have suffered considerably from the drip, owing to the continuous rain.
5	<i>C. crespilla</i> - -	Fine Crown Bark -	1,126	2 10 to 6 0	
6	<i>C. lancifolia</i> - -	Pitayo Bark - -	4	1 8 to 2 10	
7	<i>C. nitida</i> - -	Genuine Grey Bark -	8,385	1 8 to 2 9	
8	<i>C. Species</i> without name.	Fine Grey Bark -	2,706	1 8 to 2 10	The increase by propagation is 16,784 or 5,577 plants above the average of the last six months.
9	<i>C. micrantha</i> - -	Grey Bark - -	8,956	1 8 to 2 9	
10	<i>C. Peruviana</i> - -	Finest Grey Bark -	3,062	1 8 to 2 10	
11	<i>C. Pahudiana</i> - -	Unknown - -	425	Worthless.	
TOTAL Number of Plants - - -			197,639		

TABLE II.

MEMORANDUM of the Growth of Eleven Plants of *C. succirubra*, planted in the Second Denison Plantation, at Neddivutum, on 30 August 1862.

Number of Plants.	Height in Inches when Planted, 30 August 1862.	Height in Inches on 30 June 1863.	Height in Inches on 31 July 1863.	Growth in Inches during July 1863.	By Whom Planted.
1	23	70	77	7	His Excellency Sir W. Denison.
2	16½	67	72	5	
3	19	64	67	3	
4	15	66	71	5	
5	27	78	82	4	
6	20	58	61	3	J. W. Brecks, Esq. Dr. Sanderson. J. D. Sim, Esq. Lieutenant McLeod. P. Grant, Esq.
7	20	66	69	3	
8	18	68	71	3	
9	20	66	70	4	
10	20	78	81	3	
11	18	68	73	5	

TABLE II. exhibits the growth of eleven plants planted out by His Excellency the Governor and the other gentlemen on the 30th August 1862; the average growth of these plants during the month is $4\frac{1}{11}$ inches.

TABLE III.

MEMORANDUM of Chinchona Plants distributed.

NAMES.	STATIONS.	Number of Plants.	REMARKS.
Mr. F. N. Maltby - - - -	Travancore - - -	16	The number of plants issued is 679, making the total number distributed 3,595; the additional plants registered for distribution during the month is 33,750, which completes the register for 1864-65, consequently no further applications can be entertained at present.
Dr. Junghuhn - - - -	Java - - -	56	
Mr. A. R. Lascelles - - - -	Ootacamund - - -	12	
Mr. M. Anderson - - - -	Jamaica - - -	2	
Dr. Wiebe - - - -	Bombay - - -	10	
Dr. T. Anderson - - - -	Calcutta - - -	554	
Dr. Jamieson - - - -	Saharanpore - - -	107	
Professor Lees - - - -	Calcutta - - -	61	
Rajah of - - - -	Travancore - - -	321	
Major Morgan - - - -	Ootacamund - - -	116	
Mr. E. T. Fitzgerald - - - -	Calcutta - - -	261	
Mr. J. W. Money - - - -	- ditto - - -	581	
Dr. W. Bourne - - - -	- ditto - - -	420	
Captain Cox - - - -	Wainad - - -	6	
Mrs. Hollock - - - -	- ditto - - -	2	
Mr. T. Sheffield - - - -	Ootacamund - - -	12	
Mr. F. Day - - - -	Cochin - - -	100	
Mr. Brown - - - -	Tellicherry - - -	12	
M. J. Hall - - - -	Ootacamund - - -	144	
Mr. J. Knop - - - -	- ditto - - -	18	
Captain Lees - - - -	Bengal - - -	281	
Mr. W. H. Rayne - - - -	Manantoddy - - -	24	
Reverend Sayer - - - -	Ootacamund - - -	12	
M. Friend - - - -	- ditto - - -	12	
M. J. Pierie - - - -	Calicut - - -	12	
Colonel Scott - - - -	Ootacamund - - -	195	
M. J. Hunter - - - -	Coonoor - - -	12	
Colonel R. Cooper - - - -	Kotergherry - - -	12	
Colonel Woodfall - - - -	Coonoor - - -	12	
Colonel Angelo - - - -	Ootacamund - - -	12	
Total number of Plants - - -		3,595	

TABLE IV.

Register of Applications for Chinchona Plants in 1863-64.

NAMES.	STATIONS.	Number of Plants.
Mr. G. Dawson - - - -	Ootacamund - - -	1,000
" J. Chesson - - - -	Mahableshtar - - -	500
" W. Chambers - - - -	Ootacamund - - -	1,000
" A. R. Lascelles - - - -	- ditto - - -	10,000
" T. De Facian - - - -	Kartairy - - -	5,000
" G. Vincent - - - -	- ditto - - -	5,000
" J. Pierie - - - -	Calicut - - -	2,000
" E. B. Thomas - - - -	England - - -	500
" G. Stainbank - - - -	Kartairy - - -	1,000
" J. H. Schnarrie - - - -	Ootacamund - - -	5,000
" G. Southey - - - -	Walghat - - -	1,700
Major Morgan - - - -	Ootacamund - - -	1,000
Captain R. N. Taylor and heads of families at - - - -	Coorg - - -	5,000
Superintendent of Astagram Division	Mysore - - -	5,000
Mr. J. Knop - - - -	Ootacamund - - -	100
" W. T. Rayne - - - -	Manantoddy - - -	400
Captain T. H. Godfrey - - - -	Ootacamund - - -	100
Mr. P. Grant - - - -	Coimbatore - - -	100
Dr. A. E. Ross - - - -	Honore - - -	200
Major C. P. Taylor - - - -	Ootacamund - - -	500
Colonel Faber - - - -	- ditto - - -	50
Mr. S. James - - - -	- ditto - - -	200
Major Hodgson - - - -	- ditto - - -	200
Dr. F. Day - - - -	Cochin - - -	5,000

TABLE IV.—Register of Applications for Chinchona Plants in 1863-64—*continued*.

NAMES.	STATIONS.	Number of Plants.	REMARKS.
Colonel S. P. Scott - - -	Meyloor - - -	5,000	
Major C. H. Fitzgerald - - -	Calcutta - - -	1,000	
Lieutenant C. J. Jennings - - -	Ootacamund - - -	2,000	
Captain Cox - - -	Wainad - - -	200	
Dr. Macnamara - - -	Bengal - - -	1,000	
Mr. G. Hurst - - -	Darjeeling - - -	1,000	
Mr. Hall - - -	Mahableshwar - - -	500	
Rev. J. B. Sawyers - - -	Vellore - - -	1,000	
Mr. W. Stanes - - -	Coonoor - - -	3,000	
Mr. D. Boncot - - -	Cachar - - -	1,000	
Major Hutton - - -	Ootacamund - - -	5,000	
Dooroogjee Row & Co. - - -	- ditto - - -	2,000	
Mr. Jones - - -	- ditto - - -	1,000	
Mr. Nicholas - - -	- ditto - - -	1,000	
Mr. C. Sanderson - - -	Coonoor - - -	4,000	
Mr. J. Herklots - - -	- ditto - - -	10,000	
Dr. J. Rogers - - -	Ootacamund - - -	8,000	
Major Agnew - - -	Assam - - -	200	
Mr. E. T. Fitzgerald - - -	London - - -	200	
Mr. G. D. Lyon - - -	Kot Kongra - - -	50	
Mr. Græmes - - -	Ootacamund - - -	2,300	
TOTAL Number of Plants - - -		1,00,000	

Ootacamund,
11 August 1863.

(signed) *W. G. McIvor*,
Superintendent Government Chinchona Plantations.

— No. 9. —

From the Government of Madras to the Secretary of State for India.

12 September 1863.

1. Mr. McIvor, the Superintendent of the Government Chinchona Plantations on the Neilgherries, has applied to us for an increase of salary.

2. You are aware that he now draws 400 rupees per mensem for the united charge of the Chinchona Plantations and the Botanical Gardens at Ootacamund. After the Chinchona experiment had been some time in progress we considered that the additional trouble and responsibility imposed upon him should be remunerated by an increased allowance, and we therefore proposed* to raise his pay from 200 rupees to 300 rupees per mensem. This received† your sanction. Subsequently, however, we resolved to recommend that he should receive 350 rupees, to be raised to 400 rupees per mensem in the second year, and this measure also met‡ with your cordial approbation.

3. Mr. McIvor now seeks to be placed on a footing equal to that of Dr. Junghuhn, the Superintendent in charge of Chinchona Plantations in Java, to whom a salary is allowed by the Netherlands Government equivalent to 1,250 *l.* per annum.

4. You will observe that Mr. McIvor grounds his request on the alleged fact that the Chinchona cultivation has passed the condition of an experiment and become an established success; while the results which he enumerates in the 3d paragraph of his letter,§ as already accomplished, or about to be realized, and for which he seeks commensurate remuneration, have, in his opinion, been reached only by the exercise of an amount of resource, skill, and unwearied exertion on his own part which he is confident we shall not under-estimate.

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C

5. In

* To England, 6 July 1861, No. 89.

† 14 September 1861, No. 46.

‡ To England, 23d October 1862, No. 75, paragraph 11. From England, 16 January 1863, No. 2, paragraph 7. *Vide* Mr. Consul General Fraser's Report, forwarded with Despatch, dated 15 February 1862, No. 6.

§ Dated 13th August 1863, No. 73.

Proceedings of Government, 12 September 1863, No. 1687.

5. In our opinion Mr. McIvor's application is premature and unreasonable. We appreciate and have acknowledged the zeal and ability with which he has conducted the experiment by doubling his allowances; but we consider that he over-rates the importance of his services, and we are not prepared to place him in the position of the head of a scientific establishment.

6. We consider, however, that he may fairly, as the Chinchona operations extend, expect an increase of salary, and we therefore propose to allow him to draw at the rate of 500 rupees per mensem from January 1864.

Enclosure in No. 9.

From *W. G. McIvor*, Esq., Superintendent Government Chinchona Plantations, Ootacamund, to *J. D. Sim*, Esq., Secretary to Government, Revenue Department, Fort St. George, No. 73.

Sir,

Ootacamund, 13 August 1863.

1. Now that the Chinchona cultivation has passed the condition of an experiment, and become an established success, I would most respectfully solicit the favour of Government being pleased to take into favourable consideration the services I have performed, and grant me a remuneration commensurate with the results I have produced, and with the responsibility and anxiety attached to conducting so important an undertaking as the cultivation of the Quinine-yielding Chinchonas in Southern India.

2. I would observe that in the early part of this important undertaking I was perfectly willing to superintend the operations for the additional salary granted me in Government Order dated 7th September 1861, No. 1786, viz., 150 rupees per mensem for the first year, and 200 rupees per mensem for the second year; as from my observations of the nature of the plants, I at that time perceived that their introduction and cultivation could be successfully accomplished under proper management, therefore my chief object was to attain this, and to secure to the productive resources of India the important addition of Peruvian bark, while we established the means of ultimately placing within the reach of the poorer classes of the native community, in the shortest possible space of time, a remedy unequalled in its curative effects on the prevailing fevers of this country.

3. Not only have we attained an unequalled success in the management and treatment of these valuable plants, but we have, by the introduction of an entirely new system of cultivation, placed Chinchona in its early productiveness equal, if not in advance of tea and coffee, and thus accomplished a result, the importance of which cannot at present be fairly appreciated; some idea, however, may be formed of its ultimate benefit, when previously Chinchona was considered to be only productive after 40 or 50 years' growth. These results, however simple they may appear now that they are obtained, have only been accomplished by the exercise of an amount of resource, skill, and unwearied exertion on my part, which I am confident the Government will not under-estimate.

4. I most respectfully bring to the notice of the Government that the salary of Junghun, the Superintendent of Chinchona cultivation in Java, is 1,250*l.* per annum, with other perquisites, as per despatch from the Secretary of State forwarded for my information with the Government Order dated 24th October 1862, No. 2272, while the results obtained in Java, when viewed in connection with what we have accomplished, are comparatively insignificant. I am therefore confident that your Honourable Government will not hesitate to place me in a position equal to that in which the Dutch Government have placed Dr. Junghun.

Order of the Madras Government, 12th September 1863.

The Government are unable to accede to Mr. McIvor's proposal, but they will recommend to the Secretary of State that he be allowed to draw pay at the rate of 500 rupees per mensem from 1st January 1864.

— No. 10. —

From the Government of Madras to the Secretary of State for India.

Madras, 26 September 1863.

We have the honour to forward for your information the accompanying Tabular Report on the number, condition, &c., of the Chinchona plants on the Neilgherries on the 31st August 1863.

Enclosure in No. 10.

From *W. G. McIvor*, Esq., Superintendent, Government Chinchona Plantations, Ootacamund, to *J. D. Sim*, Esq., Secretary to Government, Revenue Department, Fort St. George.

Sir,

Ootacamund, 8 September 1863.

WITH reference to the Order of Government, dated 22 October 1862, No. 2263, I have the honour to enclose the report for last month of our progress in the Chinchona operations.

REPORT on the Number, Distribution, and Condition of Chinchona Plants on the Neilgherries, on the 31st August 1863.

No. of Species.	Botanical Names.	Commercial Names.	Number of Plants.	Value per lb. of Dry Bark in the London Market.	REMARKS.
				<i>s. d.</i> <i>s. d.</i>	
1	<i>C. succirubra</i> - -	Red Bark - -	70,105	2 6 to 8 9	The month being one of almost continuous rain, the earth was too wet for planting operations, and consequently only 1,172 plants were permanently planted out in the plantations, making a total of 65,955.
2	<i>C. Calisaya</i> - -	Yellow Bark - -	1,672	2 10 to 7 -	
3	<i>C. officinalis</i> , var. <i>Condaminea</i> (<i>C. Uritu-singa</i>).	Original Loxa Bark -	1,345	2 10 to 7 -	
4	<i>C. officinalis</i> , var. <i>Bonplandiana</i> (<i>C. Chahuarguera</i>).	Select Crown Bark -	119,616	2 10 to 7 -	A heavy storm on the night of the 12th and 13th almost destroyed 70 plants, and seriously broke or damaged portions of one hundred more; this happened on one of the ridges exposed to the west wind; the species which suffered most being the red bark. All the other plants continue to make rapid growth, and are in the finest state of health.
5	<i>C. crespilla</i> - -	Fine Crown Bark -	1,192	2 10 to 6 -	
6	<i>C. lancifolia</i> - -	Pitayo Bark - -	6	1 8 to 2 10	
7	<i>C. nitida</i> - -	Genuine Grey Bark -	8,388	1 8 to 2 9	
8	<i>C. Species</i> without name.	Fine Grey Bark -	2,724	1 8 to 2 10	
9	<i>C. micrantha</i> - -	Grey Bark - -	9,322	1 8 to 2 9	
10	<i>C. Peruviana</i> - -	Finest Grey Bark -	3,071	1 8 to 2 10	
11	<i>C. Pahudiana</i> - -	Unknown - -	425	Worthless.	
TOTAL Number of Plants - - -			217,866		

TABLE II.

MEMORANDUM of the Growth of Eleven Plants of *C. succirubra*, planted on the Second Denison Plantation, at Neddivuttum, on 30 August 1862.

Number of Plants.	Height in Inches when Planted on 30 August 1862.	Height in Inches on 31 July 1863.	Height in Inches on 31 August 1863.	Growth in Inches during August 1863.	By whom Planted.
1	23	77	81	4	His Excellency Sir W. Denison.
2	16½	72	76	4	
3	19	67	70	3	
4	15	71	77	6	J. W. Brecks, Esq. Dr. Sanderson. J. D. Sim, Esq. Lieutenant McLeod. P. Grant, Esq. Growth of the plants cut down for the bark sent to England.
5	27	82	88	6	
6	20	61	66	5	
7	20	69	75	6	
8	18	71	76	5	
9	20	70	76	6	
10	20	81	85	4	
11	18	73	79	6	
12	0	0	9	0	
13	0	0	10	0	

The height of the largest plant at present is 9 feet 2 inches. The blossoms on the large plant in the conservatory are now fully expanded, and promise to mature its seeds, although the plant is only a little more than two years old.

The increase by propagation is 20,977, or 8,680 plants above the average of the last six months.

TABLE II. exhibits the growth of 11 plants planted out by his Excellency the Governor, and other gentlemen, on the 30th August 1862. The average growth of these plants during the month is 5 inches. The two plants cut down on the 20th of March last, for the bark submitted to Mr. Howard for analysis have made fine strong shoots from 9 to 10 inches in height.

TABLE III.

MEMORANDUM of Chinchona Plants distributed.

Names.	Stations.	Number of Plants.	REMARKS.
Mr. F. N. Maltby - - -	Travancore - -	16	The number of plants issued to the public is 514, making the total number distributed 4,109.
Dr. Junghun - - -	Java - - -	56	
Mr. A. R. Lascelles - - -	Ootacamund - -	12	
Mr. M. Anderson - - -	Jamaica - - -	2	
Dr. Wiehe - - -	Bombay - - -	10	
Dr. T. Anderson - - -	Calcutta - - -	554	The Register for 1864-65 being completed, Table IV. is omitted in this report.
Dr. Jamieson - - -	Saharanpore - -	107	
Professor Lees - - -	Calcutta - - -	61	
Rajah of - - -	Travancore - -	521	
Major Morgan - - -	Ootacamund - -	216	
Mr. E. F. Fitzgerald - - -	Calcutta - - -	261	
Mr. J. W. Money - - -	Ditto - - -	581	
Dr. W. Bourne - - -	Ditto - - -	420	
Captain Cox - - -	Wainad - - -	6	
Mr. Hollock - - -	Ditto - - -	2	
Mr. T. Sheffield - - -	Ootacamund - -	12	
Mr. F. Day - - -	Cochin - - -	100	
Mr. Brown - - -	Tellicherry - -	12	
Mr. J. Hall - - -	Ootacamund - -	144	
Mr. J. Knop - - -	Ditto - - -	18	
Captain Lees - - -	Bengal - - -	281	
Mr. W. H. Rayne - - -	Manantoddy - -	24	
Reverend — Sayer - - -	Ootacamund - -	12	
Mr. Friend, Mr. Hallock - - -	Ditto - - -	13	
Mr. J. Pierie - - -	Calicut - - -	12	
Colonel Scott, Mr. F. Berend - -	Ootacamund - -	470	
Rev. J. Hunter, Mr. J. Mullaly - -	Coonoor - - -	24	
Col. R. Cooper, Mr. F. Cockburn - -	Kotagherry - -	24	
Colonel Woodfall - - -	Coonoor - - -	12	
Colonel Angelo, Rev. E. Laseron - -	Ootacamund - -	18	
Captain R. N. Taylor - - -	Coorg - - -	96	
Colonel Cooper - - -	Kotagherry - -	12	
TOTAL Number of Plants - - -		4,109	

Ootacamund. 8 September 1863.

(signed) *W. G. McIvor*,
Superintendent Government Chinchona Plantations.

— No. 11. —

From the Government of Madras to the Secretary of State for India.

Madras, 17 October 1863.

WE have the honour to forward for your information the accompanying Tabular Report on the number, condition, &c., of the Chinchona plants on the Neilgherries on the 30th September 1863.

Enclosure in No. 11.

From *W. G. McIvor*, Esq., Superintendent Government Chinchona Plantations, Ootacamund, to *J. D. Sim*, Esq., Secretary to Government, Revenue Department, Fort St. George, Madras, 1863, No. 95.

Ootacamund, 10 October 1863.

WITH reference to the Order of Government, dated 22d October 1862, No. 2263, I have the honour to enclose the report for last month of our progress in the Chinchona operations.

REPORT on the Number, Distribution, and Condition of Chinchona Plants on the Neilgherries, on the 30th September 1863.

No. of Species.	Botanical Names.	Commercial Names.	Number of Plants.	Value per lb. of Dry Bark in the London Market.	REMARKS.
				<i>s. d.</i> <i>s. d.</i>	
1	<i>C. succirubra</i> - -	Red Bark - -	76,599	2 6 to 8 9	During the month 667 plants were planted out in the plantations, making the total number permanently planted out 66,622.
2	<i>C. Calisaya</i> - -	Yellow Bark - -	1,725	2 10 to 7 -	
3	<i>C. officinalis</i> , var. <i>Condaminea</i> (<i>C. Uritusinga</i>).	Original Loxa Bark -	2,880	2 10 to 7 -	
4	<i>C. officinalis</i> , var. <i>Bonplandiana</i> (<i>C. Chahuarguera</i>).	Select Crown Bark -	126,863	2 10 to 7 -	The increase by propagation being 15,874, or 1,666 plants above the average of the last six months, making the total number of plants 233,476.
5	<i>C. crespilla</i> - -	Fine Crown Bark -	1,280	2 10 to 6 -	
6	<i>C. lancifolia</i> - -	Pitayo Bark - -	6	1 8 to 2 10	
7	<i>C. nitida</i> - -	Genuine Grey Bark -	8,394	1 8 to 2 9	
8	<i>C. species</i> without name.	Fine Grey Bark -	2,734	1 8 to 2 10	
9	<i>C. micrantha</i> - -	Grey Bark - -	9,473	1 8 to 2 9	
10	<i>C. Peruviana</i> - -	Finest Grey Bark -	3,097	1 8 to 2 10	
11	<i>C. Pahudiana</i> - -	Unknown - -	425	Worthless.	
TOTAL Number of Plants - - -			233,476		

TABLE II.

MEMORANDUM of the Growth of Eleven Plants of *C. succirubra*, planted on the Second Denison Plantation, at Nedddivuttum, on 30 August 1862.

Number of Plants.	Height in Inches when Planted on the 30 August 1862.	Height in Inches on the 31 August 1863.	Height in Inches on the 30 September 1863.	Growth in Inches during Sept. 1863.	By Whom Planted.
1	23	81	82½	1½	His Excellency Sir W. Denison.
2	16½	76	76	-	
3	19	70	73	3	
4	15	77	77	-	
5	27	88	92	4	
6	20	66	66½	½	J. W. Breeks, Esq. Dr. Sanderson. J. D. Sim, Esq. Lieutenant McLeod. P. Grant, Esq. Growth of the plants cut down for the bark sent to England in March 1863.
7	20	75	77	2	
8	18	76	78	2	
9	20	76	78	2	
10	20	85	88	3	
11	18	79	81	2	
12	-	9	12	3	
13	-	10	13	3	

TABLE II. exhibits the growth of 11 plants planted out by his Excellency the Governor and other gentlemen, on the 30th August 1862. The average growth of these plants during the month is $1\frac{2}{3}$ inches, or $3\frac{2}{3}$ inches under the average growth of last month. This has been caused by the continued rains, which undoubtedly retard the growth of the plants. The two plants cut down on the 20th March last for the bark submitted to Mr. Howard for analysis, have made strong shoots from 12 to 13 inches in height.

TABLE III.

SHOWING the Height of Twelve Plants of *C. officinalis* planted on the Dodabetta Plantations, on the 30 September 1863.

Number of Plants.	Height in Inches when Planted on the 30th September 1863.	REMARKS.
1	19	TABLE III. has been introduced in this report to illustrate the monthly growth of the <i>Chinchona Officinalis</i> (a shrubby species) on the Dodabetta plantation, in order to enable a comparison to be made between the growth of these plants and the 11 plants of <i>Chinchona succirubra</i> on the Nedddivuttum Plantation.
2	14½	
3	28	
4	22	
5	21½	
6	28	
7	22½	
8	21½	
9	21½	
10	19½	
11	24	
12	24	

TABLE IV.

MEMORANDUM of *Chinchona* Plants distributed.

NAMES.	STATIONS.	Number of Plants.
Mr. F. N. Maltby - - -	Travancore - - -	16
Dr. Junghun - - -	Java - - -	56
Mr. A. R. Lascelles - - -	Ootacamund - - -	12
Mr. M. Anderson - - -	Jamaica - - -	2
Dr. Wiehe - - -	Bombay - - -	10
Dr. T. Anderson - - -	Calcutta - - -	554
Dr. Jamieson - - -	Saharanpore - - -	107
Professor Lees - - -	Calcutta - - -	61
Rajah of - - -	Travancore - - -	521
Major Morgan - - -	Ootacamund - - -	216
Mr. E. T. Fitzgerald - - -	Calcutta - - -	261
Mr. J. W. Money - - -	Ditto - - -	581
Dr. W. Bourne - - -	Ditto - - -	420
Captain Cox - - -	Wainad - - -	6
Mr. Hallock - - -	Ditto - - -	2
Mr. T. Sheffield - - -	Ootacamund - - -	12
Mr. F. Day - - -	Cochin - - -	100
Mr. Brown - - -	Tellicherry - - -	12
Mr. J. Hall - - -	Ootacamund - - -	144
Mr. J. Knop - - -	Ditto - - -	18
Captain Lees - - -	Bengal - - -	281
Mr. W. H. Rayne - - -	Manantoddy - - -	24
Rev. Sayer - - -	Ootacamund - - -	12
Mr. Friend - - -	Ditto - - -	12
Mr. Hallock - - -	Ditto - - -	1
Mr. J. Pierie - - -	Calicut - - -	12
Colonel Scott - - -	Ootacamund - - -	212
Mr. F. Berend - - -	Ditto - - -	275
Rev. J. Hunter - - -	Coonoor - - -	12
Mr. J. Mullaly - - -	Ditto - - -	24
Mr. W. H. Stanes - - -	Ditto - - -	12
Col. R. Cooper - - -	Kotagherry - - -	12
Mr. F. Cockburn - - -	Ditto - - -	12
Colonel Woodfall - - -	Coonoor - - -	12
Mr. C. Anderson - - -	Ditto - - -	12
Colonel Angelo - - -	Ootacamund - - -	12
Rev. E. Laseron - - -	Ditto - - -	6
Captain R. N. Taylor - - -	Coorg - - -	96
Major W. Agnew - - -	Assam - - -	139
Mr. V. H. Levinge - - -	Madura - - -	12
Chief Commissioner - - -	Nagpore - - -	28
Mr. Fletcher - - -	Ootacamund - - -	24
Gool Mahamud - - -	Ditto - - -	20
TOTAL Number of Plants - - -		4,373

The number of plants issued to the public is 264, making the total number distributed 4,373. The height of the largest plant is 9 feet 6 inches, the circumference of the stem at 6 inches above the ground, being 9½ inches.

— No. 12. —

From the Government of Madras to the Secretary of State for India.

Madras, 11 November 1863.

IN continuation of our letter, 12 September 1863, No. 97, we have the honour to forward a further letter from Mr. McIvor, the Superintendent of the Government Chinchona Plantations, relative to the increase of salary solicited by him; together with our proceedings thereon, dated 5th instant, No. 1993, from which you will observe that, considering Mr. McIvor to have a fair claim to travelling allowance, we have granted him the same rate as is drawn by deputy collectors and magistrates of the first class, viz., three rupees per diem, and have permitted him to draw this allowance throughout the year.

Enclosure in No. 12.

From *W. G. McIvor*, Esq., Superintendent Government Chinchona Plantations, to
J. D. Sim, Esq., Secretary to Government, Revenue Department, Fort St. George.

Sir,

Ootacamund, 10 October 1863.

1. THE Government, in their Order of the 12th September 1863, No. 1687, being unable to accede to my proposal, and having been pleased to express their intention to recommend to the Secretary of State that I be allowed to draw pay at the rate of 500 rupees per mensem from the 1st January 1864, I would most respectfully solicit the favour of this communication, together with my letter of the 13th August 1863, being forwarded for the consideration of the Right Honourable the Secretary of State for India with the recommendation above mentioned.

2. I beg to bring to the notice of Government, that the conduct of the Chinchona operations shall always have my best exertions and utmost care, without reference to pay, as, in fact, any remuneration the Government can allow me is but a small reward compared to the gratification conveyed to my mind by the daily development of the correctness of all that I have advanced with reference to the treatment of the plants, combined with the great success of our operations, and the consciousness that our labours will confer great benefit to the present and to future generations.

3. The reason for bringing the subject of my pay under the consideration of your Honourable Government was because the sum hitherto allowed me has scarcely met the additional expenditure imposed upon me by the direction of the Chinchona operations, and I felt confident the Government would not wish this to exist in the present state of the undertaking. Besides other expenses, the plantations being a great distance apart necessitates the keep of additional servants and three horses, in order to enable me frequently to visit them, as well as the selected sites, for the purpose of making observations.

4. I respectfully submit that the value of my services, and the direct saving I have effected to the State, are well known to Government; I therefore feel it sufficient briefly to observe, for the information of the Secretary of State, that, having been trained from my youth to the treatment of plants, and possessing an intimate knowledge of this climate and its effects on vegetation, together with a natural talent for the management of labour and the direction of operations, has enabled me to produce for the Government results in this important undertaking which have never been equalled. In order to form an idea of what we have accomplished, a comparison is necessary, and I select for this the cultivation of the plants in their "proper home in the moist region of Darjeeling," under the superintendence of Dr. Anderson.

5. Dr. Anderson commenced the cultivation of Chinchonas in the Calcutta Botanical Gardens in the early part of 1861, and by the end of February of that year had raised "about 80 seedlings," or a greater number by 15 plants than we had on the Neilgherries at that date. Dr. Anderson received a subsequent supply of plants and seed from Java, and 554 plants were supplied to that gentleman from our nurseries. His report of the 3d August 1863 gives the expenditure on the plants at Darjeeling, to the 30th of April last, at Rs. 11,639. 2. 6. The number of plants on the 30th April are not given, but the report shows the number on the 1st of that month to be (deducting the worthless species *Pahudiana*) 919; add to this number 570, the maximum increase which could have been obtained in April, makes the total number of plants on the 30th of April, 1,489: thus the actual cost of each plant to the Bengal Government is Rs. 7. 12. 7.

6. The cost of our propagation and nursery departments, from the commencement up to the same date (30th April 1863), being as follows :—

	<i>Rs.</i>	<i>a.</i>	<i>p.</i>
Deputy Superintendent's salary - - - - -	2,497	15	3
Permanent Establishment - - - - -	2,882	-	-
Saderwarid and Contingencies - - - - -	1,607	-	-
Add interest at 10 per cent. for $1\frac{1}{2}$ years on 3,370 rupees expended on permanent buildings in 1861-62 - - -	505	8	-
Ditto for one year on 2,522 rupees expended on permanent buildings in 1862-63 - - - - -	252	3	2
Total Expenditure to the 30th April 1863 -	7,744	10	5

Our number of plants on the 30th April last (deducting the worthless species <i>Pahudiana</i>) was 159,907, making the cost of our plants to Government $9\frac{1}{3}$ of a pie, or about one penny each, while, had our plants been produced at the rate at Darjeeling, the cost to Government of 159,907 plants would be - - - - -	12,45,109	3	1
From which deducting our expenditure of - - - - -	7,744	10	5
Gives a net saving to Government on the propagating and nursery departments alone of - - - - - <i>Rs.</i>	12,37,364	8	8

and, in addition to this large saving of upwards of 123,000 *l.* sterling, the saving in time may be considered as even more important.

7. In order to avoid delay, I undertook the construction of the buildings required for the plantations and propagating departments. These I have completed in the most efficient manner, and in the shortest possible space of time, at certainly one-half of the amount they would have cost Government had they been erected by the Department of Public Works, so that in the buildings alone, a work to which I have not been trained, my resource and exertions in directing the labour has effected a saving of over 19,000 rupees on the engineer's estimates.

8. I am unable to give a comparison of the saving effected on the formation of our plantations; as elsewhere this stage has not been attained in the cultivation of the plants; I trust, however, that the above facts are sufficient to secure the favourable consideration of my claim to the increase of salary solicited in my letter of the 13th August last.

ORDER of the MADRAS GOVERNMENT, 5 November 1863.

1. THE Government consider that Mr. McIvor has a fair claim to travelling allowance, and resolve to grant him the same rate as is drawn by deputy collectors and magistrates of the first class, viz., three rupees per diem. Mr. McIvor will draw this throughout the year.

2. The above Order will be reported to the Home Government in continuation of the Despatch dated 12 September 1863, No. 97.

J. D. Sim,
Secretary to Government.

— No. 13. —

From the Government of Madras to the Secretary of State for India.

Madras, 20 November 1863.

WE have the honour to forward, for your information, the accompanying
Tabular Report* on the number, condition, &c., of the Chinchona Plants on the
Neilgherries, on the 31st October 1863.

* Proceedings
of Government, 19
November 1863,
Nos. 247 and 248.

Enclosure in No. 13.

REPORT on the Number, Distribution, and Condition of Chinchona Plants on the Neilgherries, on
31 October 1863.

No. of Species.	Botanical Names.	Commercial Names.	Number of Plants.	Value per lb. of Dry Bark in the London Market.	REMARKS.
				s. d. s. d.	
1	<i>C. succirubra</i> - -	Red Bark - -	80,550	2 6 to 8 9	The planting season having passed, the number of plants per- manently planted out on the plan- tations remain the same as at the end of last month, viz., 66,622.
2	<i>C. Calisaya</i> - -	Yellow Bark - -	1,735	2 10 to 7 -	
3	<i>C. officinalis</i> , var. Condaminea (<i>C.</i> Uritusinga).	Original Loxa Bark	4,733	2 10 to 7 -	
4	<i>C. officinalis</i> , var. Bon- plandiana (<i>C.</i> Cha- huarguera).	Select Crown Bark -	135,358	2 10 to 7 -	The increase by propagation during the month is 14,897, or 155 plants under the average of the last six months, making the total num- ber of plants 248,166.
5	<i>C. crespilla</i> - -	Fine Crown Bark -	1,373	2 10 to 6 -	
6	<i>C. lancifolia</i> - -	Pitayo Bark - -	6	1 8 to 2 10	
7	<i>C. nitida</i> - -	Genuine Grey Bark	8,399	1 8 to 2 9	
8	<i>C. Species</i> without name.	Fine Grey Bark -	2,736	1 8 to 2 10	
9	<i>C. micrantha</i> - -	Grey Bark - -	9,719	1 8 to 2 9	
10	<i>C. Peruviana</i> - -	Finest Grey Bark -	3,132	1 8 to 2 10	
11	<i>C. Pahudiana</i> - -	Unknown - -	425	Worthless.	
TOTAL Number of Plants - - -			248,166		

TABLE II.

MEMORANDUM of the Growth of Eleven Plants of *C. succirubra*, planted
on the Second Denison Plantation, at Neddivuttum, on 30 August 1862.

Number of Plants.	Height in Inches when Planted on 30 August 1862.	Height in Inches on 30 September 1863.	Height in Inches on 31 October 1863.	Growth in Inches during October 1863.	By whom Planted.
1	23	82½	87	4½	His Excellency Sir W. Denison.
2	16½	76	80	4	
3	19	73	76	3	
4	15	77	81½	4½	
5	27	92	96	4	
6	20	66½	69½	3	J. W. Breeks, Esq. Dr. Sanderson. J. D. Sim, Esq. Lieutenant McLeod. P. Grant, Esq. Growth of the plants cut down for the bark sent to England.
7	20	77	82	5	
8	18	78	83	5	
9	20	78	82½	4½	
10	20	88	90½	2½	
11	18	81	83	2	
12	-	12	16	4	
13	-	13	16	3	

TABLE II. exhibits the growth
of 11 plants planted out by his
Excellency the Governor, and
other gentlemen, at Neddivuttum,
on the 30th August 1862. The
average growth of these plants
during the month being $3\frac{2}{3}$ inches,
or two inches above the average
growth of last month. The cir-
cumference of the stems on the
30th ultimo averaging $5\frac{4}{11}$ inches.

The two plants cut down on the
20th March last, for the bark sub-
mitted to Mr. Howard for analysis,
have made strong shoots of 16
inches in height. The average
growth of these during the month
is $3\frac{1}{2}$ inches, or $\frac{1}{2}$ an inch above
the growth of last month.

TABLE III.

SHOWING the Height of Twelve Plants of *C. officinalis* planted on the Dodabetta Plantations, at Ootacamund on the 30th September 1863.

Number of Plants.	Height in Inches when Planted on the 30th September 1863.	Height in Inches on the 31st October 1863.	Growth in Inches during October 1863.	REMARKS.
1	19	22	3	The 12 plants of <i>Chinchona officinalis</i> (a shrubby species) on the Dodabetta Plantation, gives an average growth of $3\frac{1}{2}$ inches during the month, or $\frac{1}{3}$ th of an inch above the growth of the <i>Ned-divuttum</i> plants. A heavy storm on the 14th, 15th, and 16th of last month did considerable damage, breaking 35 of our largest plants, and causing the entire loss of 253 smaller plants, which were either buried under land slips or washed away by the flood.
2	14 $\frac{1}{2}$	16 $\frac{1}{2}$	2	
3	28	31 $\frac{1}{2}$	3 $\frac{1}{2}$	
4	22	25	3	
5	21 $\frac{1}{2}$	24 $\frac{1}{2}$	3	
6	28	31 $\frac{1}{2}$	3 $\frac{1}{2}$	
7	22 $\frac{1}{2}$	25	2 $\frac{1}{2}$	
8	21 $\frac{1}{2}$	27	5 $\frac{1}{2}$	
9	21 $\frac{1}{2}$	26 $\frac{1}{2}$	5	
10	19 $\frac{1}{2}$	23 $\frac{1}{2}$	4	
11	24	26 $\frac{1}{2}$	2 $\frac{1}{2}$	
12	24	25	1	

TABLE IV.

MEMORANDUM of *Chinchona* Plants distributed.

NAMES.	STATIONS.	Number of Plants.
Mr. F. N. Maltby -	Travancore -	16
Dr. Junghun -	Java -	56
Mr. A. R. Lascelles -	Ootacamund -	12
„ M. Anderson -	Jamaica -	2
Dr. Wiebe -	Bombay -	10
„ F. Anderson -	Calcutta -	554
„ Jamieson -	Saharanpore -	107
Professor Lees -	Calcutta -	61
Rajah of -	Travancore -	521
Major Morgan -	Ootacamund -	216
Mr. E. F. Fitzgerald -	Calcutta -	261
„ J. W. Money -	ditto -	581
Dr. W. Bourne -	ditto -	420
Captain Cox -	Wainad -	6
Mr. Hallock -	ditto -	2
„ T. Sheffield -	Ootacamund -	12
„ F. Day -	Cochin -	100
„ Brown -	Tellicherry -	12
„ J. Hall -	Ootacamund -	144
„ J. Knop -	ditto -	18
Captain Lees -	Bengal -	281
Mr. W. H. Rayne -	Manantoddy -	24
Rev. Sawyer -	Ootacamund -	12
Mr. Friend -	ditto -	12
„ Hallock -	ditto -	1
„ J. Perie -	Calicut -	12
Colonel Scott -	Ootacamund -	212
Mr. F. Berend -	ditto -	275
Rev. J. Hunter -	Coonoor -	12
Mr. J. Mullaly -	ditto -	24
„ W. H. Stanes -	ditto -	12
Colonel R. Cooper -	Kotagherry -	12
Mr. F. Cockburn -	ditto -	12
Colonel Woodfall -	Coonoor -	12
Mr. C. Anderson -	ditto -	24
Colonel Angelo -	Ootacamund -	12
Rev. E. Laseron -	ditto -	12
Captain R. N. Taylor -	Coorg -	96
Major W. Agnew -	Assam -	139
Mr. V. H. Levinge -	Madura -	12
Chief Commissioner -	Nagpore -	28
Mr. Fletcher -	Ootacamund -	24
Gool Mahomed -	ditto -	20
General McCleverty -	New Zealand -	23
Mr. W. Robinson -	Kotagherry -	6
„ Crake -	Wainad -	12
„ H. R. Dawson -	Seegoor -	12
Captain Mann -	Coorg -	36
		4,480

The number of plants issued to the public is 107, making the total number of plants distributed 4,480.

— No. 14. —

From the Government of Madras to the Secretary of State for India.

Madras, 11 December 1863.

WE have the honour to forward for your information the accompanying Tabular Report* on the number, condition, &c., of the Chinchona Plants on the Neilgherries on the 30th November 1863.

* Proceedings
of Government, 11
December 1863,
Nos. 185 and 186.

Enclosure in No. 14.

From *W. G. McIvor*, Esq., Superintendent Government Chinchona Plantations, to
J. D. Sim, Esq., Secretary to Government, Revenue Department, Fort St. George.

Sir,

Ootacamund, 7 December 1863.

As the progress of Chinchona cultivation in India is attracting the attention of many scientific gentlemen in Europe, I am frequently asked for information on the subject; and therefore respectfully beg to solicit the favour of being regularly furnished with six copies of my monthly reports for distribution.

REPORT on the Number, Distribution, and Condition of Chinchona Plants on the Neilgherries, on
30 November 1863.

No. of Species.	Botanical Names.	Commercial Names.	Number of Plants.	Value per lb. of Dry Bark in the London Market.	REMARKS.
				<i>s. d.</i> <i>s. d.</i>	
1	<i>C. succirubra</i> - -	Red Bark - -	82,558	2 6 to 8 9	The planting season having passed, the number of plants permanently planted out in the plantations remain the same as at the end of last month, viz., 66,622.
2	<i>C. Calisaya</i> - -	Yellow Bark - -	1,750	2 10 to 7 0	
3	<i>C. officinalis</i> , var. <i>Condaminea</i> (<i>C.</i> <i>Uritusinga</i>).	Original Loxa Bark	6,219	2 10 to 7 0	
4	<i>C. officinalis</i> , var. <i>Bonplandiana</i> (<i>C.</i> <i>Chahuarguera</i>).	Select Crown Bark -	142,717	2 10 to 7 0	The increase by propagation during the month is 13,312 or 2,129 plants under the average of the last six months, making the total number of plants 259,396.
5	<i>C. crespilla</i> - -	Fine Crown Bark -	1,449	2 10 to 6 0	
6	<i>C. lancifolia</i> - -	Pitayo Bark - -	6	1 8 to 2 10	
7	<i>C. nitida</i> - -	Genuine Grey Bark	8,402	1 8 to 2 9	
8	<i>C. Species</i> without name.	Fine Grey Bark -	2,741	1 8 to 2 10	
9	<i>C. micrantha</i> - -	Grey Bark - -	9,986	1 8 to 2 9	
10	<i>C. Peruviana</i> - -	Finest Grey Bark -	3,143	1 8 to 2 10	
11	<i>C. Pahudiana</i> - -	Unknown - -	425	Unknown.	
TOTAL Number of Plants - - -			259,396		

TABLE II.

MEMORANDUM of the Growth of Eleven Plants of *C. succirubra*, planted on the Second Denison Plantations, at Neddivuttum, on 30 August 1862.

Number of Plants.	Height in Inches when Planted on 30 August 1862.	Height in Inches on 31 October 1863.	Height in Inches on 30 November 1863.	Height in Inches during November 1863.	By whom Planted.
1	23	87	92	5	His Excellency Sir William Denison.
2	16½	80	84	4	
3	19	76	79½	3½	
4	15	81½	84	2½	
5	27	96	98	2	J. W. Breeks, Esq. Dr. Sanderson. J. D. Sim, Esq. Lieutenant McLeod. P. Grant, Esq.
6	20	69½	73	3½	
7	20	82	89	7	
8	18	83	87	4	
9	20	82½	88	5½	
10	20	90½	94	3½	
11	18	83	86½	2½	

TABLE II. exhibits the growth of eleven plants planted out by his Excellency the Governor, and other gentlemen at Neddivuttum, on the 30th August 1862. The average growth of these plants during the month is $3\frac{10}{11}$ inches or $\frac{1}{11}$ inch above the average growth of last month.

The two plants cut down on the 20th of March last, for the bark submitted to Mr. Howard for analysis, have made strong shoots from 19 to 19½ inches in height. The average growth of these during the month is $3\frac{1}{4}$ inches or $\frac{1}{4}$ inch under the average growth of last month.

TABLE III.

SHOWING the Height of Twelve Plants of *C. officinalis*, planted on the Dodabetta Plantations at Ootacamund on 30 September 1863.

Number of Plants.	Height in Inches when Planted on 30 September 1863.	Height in Inches on 31 October 1863.	Height in Inches on 30 November 1863.	Growth in Inches during November 1863.	REMARKS.
1	19	22	25	3	The twelve plants of <i>Chinchona officinalis</i> (a shrubby species) on the Dodabetta plantation gives an average growth of three inches during the month, or $\frac{10}{11}$ inches under the growth of the Neddi-vuttum plants.
2	14 $\frac{1}{2}$	16 $\frac{1}{2}$	19 $\frac{1}{2}$	3	
3	28	31 $\frac{1}{2}$	34 $\frac{1}{2}$	3	
4	22	25	28	3	
5	21 $\frac{1}{2}$	24 $\frac{1}{2}$	27	2 $\frac{1}{2}$	
6	28	31 $\frac{1}{2}$	35	3 $\frac{1}{2}$	
7	22 $\frac{1}{2}$	25	28 $\frac{1}{2}$	3 $\frac{1}{2}$	
8	21 $\frac{1}{2}$	27	30	3	
9	21 $\frac{1}{2}$	26 $\frac{1}{2}$	29	2 $\frac{1}{2}$	
10	19 $\frac{1}{2}$	23 $\frac{1}{2}$	27	3 $\frac{1}{2}$	
11	24	26 $\frac{1}{2}$	29	2 $\frac{1}{2}$	
12	24	25	28	3	

TABLE IV.

MEMORANDUM of Chinchona Plants Distributed.

NAMES.	STATIONS.	No. of Plants.
Mr. F. N. Maltby -	Travancore -	16
Dr. Junghun -	Java -	56
Mr. A. R. Lascelles -	Ootacamund -	12
Mr. M. Anderson -	Jamaica -	2
Dr. Wiehe -	Bombay -	10
Dr. T. Anderson -	Calcutta -	554
Dr. Jamieson -	Saharanpore -	107
Professor Lees -	Calcutta -	61
Rajah of -	Travancore -	521
Major Morgan -	Ootacamund -	216
Mr. E. T. Fitzgerald -	Darjeling -	261
Mr. J. W. Money -	ditto -	581
Dr. W. Bowme -	ditto -	420
Captain Cox -	Wainad -	6
Mr. Hallock -	ditto -	2
Mr. T. Sheffield -	Ootacamund -	12
Dr. F. Day -	Cochin -	100
Mr. Brown -	Tellicherry -	12
Mr. J. Hall -	Ootacamund -	144
Mr. J. Knop -	ditto -	18
Captain Lees -	Bengal -	281
M. W. H. Rayne -	Manantoddy -	24
Reverend Sayer -	Ootacamund -	18
Mr. Friend -	ditto -	12
Mr. Hallock -	ditto -	1
Mr. J. Perie -	Seegoor -	12
Colonel Scott -	Ootacamund -	212
Mr. F. Berend -	Cachar -	275
Rev. J. Hunter -	Coonoor -	12
M. J. Mullaly -	ditto -	24
Mr. W. H. Stanes -	ditto -	12
Colonel R. Cooper -	Kotagherry -	12
Mr. F. Cockburn -	ditto -	12
Colonel Woodfall -	Coonoor -	12
M. C. Anderson -	ditto -	24
Colonel Angelo -	Ootacamund -	12
Rev. E. Laseron -	ditto -	12
Captain R. N. Taylor -	Coorg -	96
Major W. Agnew -	Assam -	139

The number of plants issued to the public is 2,082, making the total number of plants distributed 6,562.

TABLE IV.—MEMORANDUM of Chinchona Plants Distributed—*continued*.

NAMES.	STATIONS.	No. of Plants.	REMARKS.
Mr. V. H. Levinge	Madura	12	
Chief Commissioner	Nagpore	28	
Mr. Fletcher	Ootacamund	24	
Gool Mahomed	ditto	20	
General McCleverty	New Zealand	23	
Mr. W. Robinson	Kotagberry	6	
Mr. Crake	Wainad	12	
Mr. H. R. Dawson	Seegoor	12	
Captain Mann	Coorg	36	
Mr. E. Roberts	Ootacamund	6	
Mr. H. Rossall	Wainad	12	
Rev. Wait	Coonoor	2	
Mr. H. de Facien	Katarry	2,056	
TOTAL Number of Plants		6,562	

Ootacamund,
7 December 1863.

(signed) *W. G. McIvor*,
Superintendent Government Chinchona Plantations.

—No. 15.—

From Sir *Charles Wood* to the Government of Madras.

India Office, 30 January 1864.

1. I HAVE considered in Council your letters, in the Revenue Department, noted in the margin, reporting the progress of Chinchona cultivation on the Neilgherry Hills, which appears to me to be exceedingly satisfactory. That after less than three years there should be a quarter of a million of these valuable trees growing in India, 66,622 permanently planted out, and nearly 5,000 distributed amongst private cultivators, are results which reflect the highest credit on Mr. McIvor; while the fact that the whole number of plants authorised to be sold (100,000) has already been applied for, is a proof that the great importance of this cultivation is fully appreciated throughout India. I observe, too, with satisfaction, that on the whole the plants have passed through the trying and severe storms of July and August with as little injury as they experienced from the dry and cold weather of the winter months.

Dated—
16 June 1863.
13 July "
12 Aug. "
15 " "
12 Sept. "
25 " "
9 Oct. "
17 " "
11 Nov. "
20 " "
11 Dec. "

2. The specimens of Chinchona bark and leaves were duly received with your letter, dated October 9 (No. 110) 1863, and were sent to Mr. Howard for analysis. I now transmit 15 copies of that gentleman's report, which announces a result even more promising than the former analysis, and which will be valuable to Mr. McIvor in his investigations as to the best time for cutting the bark, and the most favourable conditions for the secretion of febrifuge alkaloids.

3. The suggestion contained in your letter, dated August 12th (No. 80) 1863, that the Government manufactory of quinine should eventually be established at Ootacamund will receive careful consideration; and, in a future despatch, I will inform you of the result of inquiries, which I shall cause to be made on the subject.

4. In former despatches I have expressed my sense of the value of Mr. McIvor's services, and I now cordially approve of the increase of salary and travelling allowances which you have granted to that gentleman, as reported in your letters, dated 12 September (No. 97), and 11 November (No. 120) 1863.

15

— No. 16. —

COPY PUBLIC DESPATCH to Madras, dated 29 February 1864, No. 10.

1. I HAVE given directions for the transmission of 11 copies of Mr. Howard's work on Chinchona plants ("Nueva Quinologia de Pavon") for distribution in your Presidency. It will be valuable for purposes of reference to all persons who are interested in Chinchona cultivation; and copies should be forwarded to the public libraries in Madras, to the office of the Conservator of Forests, to station libraries in the hill districts, and to the offices of collectors or assistants to collectors in those collectorates and districts where the Chinchona plant has been or is likely to be brought under cultivation.

2. Mr. McIvor, the Superintendent of Chinchona Plantations on the Neilgherry Hills, has already been supplied with a copy of this work.

— No. 16 a. —

REPORT on the Bark and Leaves sent home in October 1863 for Examination by J. E. Howard, Esq.

(See Mr. McIvor's letter dated 3d October 1863.)

From J. E. Howard, Esq., to The Under Secretary of State for India.

Sir,

December 1863.

THE box of specimens reached me in good condition, and has furnished valuable materials for further research, although the quantity of bark sent this time amounted to but a few ounces in weight. Several pounds weight of leaves (well-dried and with a marked tea-like fragrance) have allowed me the opportunity of following various lines of experiment, in order to ascertain their probable commercial value. I regret to be obliged to confirm the opinion I expressed in my last, that the leaves will not supply material for the extraction of quinine, although the quantity of the first rough precipitate from an acid solution, having the appearance of a hydrated alkaloid, is considerably more than I succeeded in obtaining before, being equal to 1.31 per cent. of the weight of the leaves. Of this a small portion was soluble in ether, to the extent of 0.17 per cent., forming a clear yellow solution which precipitates on the addition of a solution of oxalic acid in spirit of wine. Nevertheless, the further prosecution of the inquiry and the attempt to purify the alkaloid, showed me clearly that I had to do with a state of things very different from that which exists in the bark, and that I should not succeed in obtaining an available salt of quinine. I hope to be able to prosecute this research on a still larger quantity of the material in order to test the conclusions to which my present investigation tends. The alkaloid exists in the leaves in very intimate relationship with the green colouring matter. This latter substance is well deserving of a more elaborate investigation as it seems to be somewhat analogous to indigo, and its ethereal solution has a peculiar effect on the rays of light, the reflected ray having almost a blood-red colour, whilst the transmitted ray is a fine green.

I will now notice the remaining specimens. Nos. 1 and 2, though presenting a promising appearance, were in too small quantity to justify examination. No. 3, "red bark from branches of 18 months and under" yielding me not less than 6 per cent. of rough alkaloid, but of this a larger proportion seemed to be *Quinidine* and *Chinchonidine*, but as I had little more than an ounce of bark to examine, I cannot consider this comparative result as an ascertained fact. As these barks were cut at the period when the sap is in full flow, it is not at all improbable that the alkaloids may vary somewhat from those produced at a different season. The above 6 per cent. of alkaloid yielded in a state of further purification 4.10 per cent.

cent. of *Quinidine*, *Chinchonidine*, and *Quinine*, and also a portion, 0·9 per cent., insoluble in ether, in all 5 per cent. The portion insoluble in ether and not capable of being crystallised from spirit I set down as *Chinchonicine*, and not pure *Chinchonine*, of which last I find but few indications in these young barks. The *Quinidine* crystallises as hydriodate, and the *Chinchonidine* as a resinous mass when united with hydriodic acid. Both form a feathery crystallisation as sulphates.

No. 5, "Red Bark from small branches broken by the wind," gave a result very nearly resembling the analysis of the leaves. This is not surprising, considering the very immature state of these succulent branches. I obtained 1 per cent. of alkaloid soluble in ether, which gave a doubtful trace of crystallisation as sulphate. A further portion of impure alkaloid insoluble in ether resembled the same substance as described under No. 3.

The No. 8, *Ch. micrantha* bark, from small branches broken by the wind, gave, on examination, more chincho-tannic acid than No. 5. The precipitated alkaloids appeared to be, as above, 1 per cent., but of this 0·40 per cent. proved to be oxydised tannin, and insoluble in ether. The rest in part crystallised from ether, and in part formed a quinine-like mass. The crystalline portion formed crystals as hydriodate, indicating the *Quinidine* of Pasteur. The total proved to be *Quinidine* (*Quinine*?) and a trace of *Chinchonine* 0·60 per cent.

No. 9, *Ch. Pahudiana* contained more chincho-tannic acid than even the last. The precipitate of alkaloid was minute, and much implicated with stringent colouring matter. Ether dissolved a small portion, in which, on evaporation, crystals could be perceived. This bark, in the state in which sent, has scarcely any bitter taste, and would be worthless in commerce. I cannot say what the mature bark might be after some years' growth, but doubt whether it can ever repay the expense of cultivation. I may remark that this bark a good deal resembles that of *Ch. purpurea* in its external appearance; and also that the bark of *Ch. micrantha* now sent has much the same character as that which characterises the bark of the same *Chinchona* as grown in South America.

I find similar characteristic colouring in the leaves of the three species sent, *Chinchona officinalis micrantha*, and *succirubra*. The same also seems (a little altered) to prevade the specimen of wood, marking a difference from the heart wood of *Ch. succirubra* of many years' growth which I have before examined.

I have &c.,

John Eliot Howard.

— No. 17.—

From the Government of Madras to the Secretary of State for India.

Madras, 11 January 1864.

Proceedings of Government, 11 January 1864, Nos. 102 and 103.

WE have the honour to forward for your information the accompanying tabular Report* on the number, condition, &c., of the Chinchona plants on the Neilgherries on the 31st December 1863.

Enclosure in No. 17.

REPORT on the Number, Distribution, and Condition of Chinchona Plants on the Neilgherries, on 31 December 1863.

No. of Species.	Botanical Names.	Commercial Names.	Number of Plants.	Value per Lb. of Dry Bark in the London Market.		REMARKS.
				s. d.	s. d.	
1	C. succirubra - -	Red Bark - - -	86,742	2	6 to 8	The planting season having passed, the number of plants per- manently planted out on the plan- tations remain the same as at the end of last month, viz., 66,622.
2	C. Calisaya - -	Yellow Bark - - -	1,768	2	10 to 7	
3	C. officinalis, var. Condaminea (C. Uritusinga).	Original Loxa Bark	6,350	2	10 to 7	
4	C. officinalis, var. Bonplandiana (C. Chahuarguera).	Select Crown Bark -	155,780	2	10 to 7	The increase by propagation during the month is 18,657, or 2,603 plants above the average of the last six months, making the total number of plants 277,083.
5	C. crespilla - -	Fine Crown Bark -	1,569	2	10 to 6	
6	C. lancifolia - -	Pitayo Bark - - -	6	1	8 to 2	
7	C. nitida - -	Genuine Grey Bark -	8,406	1	8 to 2	
8	C. species without name.	Fine Grey Bark -	2,745	1	8 to 2	
9	C. micrantha - -	Grey Bark - - -	10,139	1	8 to 2	
10	C. Peruviana - -	Finest Grey Bark -	3,153	1	8 to 2	
11	C. Pahudiana - -	Unknown - - -	425	Unknown.		
TOTAL Number of Plants - - -			277,083			

TABLE II.

MEMORANDUM of the Growth of Eleven Plants of *C. succirubra*, planted on the Second Denison Plantation, at Neddivuttum, on 30 August 1862.

Number of Plants.	Height in Inches when Planted, on 30 August 1862.	Height in Inches on 30 November 1863.	Height in Inches on 31 December 1863.	Height in Inches during December 1863.	By Whom Planted.
1	23	92	93	1	His Excellency Sir William Denison.
2	16½	84	86	2	
3	19	79½	81	1½	
4	15	84	86	2	
5	27	98	99	1	
6	20	73	74	1	J. W. Breeks, Esq.
7	20	89	90	1	Dr. Sanderson.
8	18	87	89	2	J. D. Sim, Esq.
9	20	88	89	1	Lieutenant McLeod.
10	20	94	94	-	P. Grant, Esq.
11	18	85½	87	1½	

TABLE II. exhibits the growth of 11 plants planted out by his Excellency the Governor and other gentlemen at Neddivuttum on the 30th August 1862. The average growth of these plants during the month is 1½ inches, or 2 inches less than the average growth of last month.

The two plants cut down on the 20th of March last, for the bark submitted to Mr. Howard for analysis, have made strong shoots from 19½ to 21 inches in height. The average growth of these plants during the month is 2 inches, or ¼ inch under the average growth of last month.

TABLE III.

SHOWING the Height of Twelve Plants of *C. officinalis* planted on the Dodabetta Plantation at Ootacamund on the 30th September 1863.

Number of Plants.	Height in Inches when Planted on the 30th September 1863.	Height in Inches on the 30th November 1863.	Height in Inches on the 31st December 1863.	Growth in Inches during December 1863.	REMARKS.
1	19	25	28	3	The 12 plants of <i>Chinchona officinalis</i> (a shrubby species) on the Dodabetta Plantation gives an average growth of $2\frac{3}{4}$ inches during the month, or $\frac{1}{4}$ inch under the average growth of last month. The number of plants issued to the public is 970, making the total number of plants distributed 7,532. A few capsules on the flowering plant of <i>Chinchona succirubra</i> are fully formed and have every appearance of maturing seeds.
2	$14\frac{1}{2}$	$19\frac{1}{2}$	22	$2\frac{1}{2}$	
3	28	$34\frac{1}{2}$	41	$6\frac{1}{2}$	
4	22	28	30	2	
5	$21\frac{1}{2}$	27	29	2	
6	28	35	38	3	
7	$22\frac{1}{2}$	$28\frac{1}{2}$	$29\frac{1}{2}$	1	
8	$21\frac{1}{2}$	30	$32\frac{1}{2}$	$2\frac{1}{2}$	
9	$21\frac{1}{2}$	29	32	3	
10	$19\frac{1}{2}$	27	29	2	
11	24	29	31	2	
12	24	28	30	2	

TABLE IV.

MEMORANDUM of Chinchona Plants Distributed.

NAMES.	STATION.	Number of Plants.
Mr. F. N. Maltby -	Travancore -	16
Dr. Junghuhn -	Java -	56
Mr. A. R. Lascelles -	Ootacamund -	12
„ M. Anderson -	Jamaica -	2
Dr. Wiehe -	Bombay -	10
„ T. Anderson -	Calcutta -	554
„ Jamieson -	Saharanpore -	107
Professor Lees -	Calcutta -	61
Rajah of -	Travancore -	521
Major Morgan -	Ootacamund -	216
Mr. E. T. Fitzgerald -	Calcutta -	261
„ J. W. Money -	- ditto -	581
Dr. W. Bourne -	- ditto -	420
Captain Cox -	Wainad -	6
Mr. Hallock -	- ditto -	2
„ T. Sheffield -	Ootacamund -	12
Dr. F. Day -	Cochin -	100
Mr. Brown -	Tellicherry -	12
„ J. Hall -	Ootacamund -	144
„ J. Knop -	- ditto -	18
Captain Lees -	Bengal -	281
Mr. W. H. Rayne -	Manantoddy -	24
Rev. Sawyer -	Ootacamund -	18
Mr. Friend -	- ditto -	12
„ Hallock -	- ditto -	1
„ J. Perie -	Seegoor -	12
Colonel Scott -	Ootacamund -	212
Mr. F. Berend -	Cachar -	275
Rev. J. Hunter -	Coonoor -	12
Mr. J. Mullaly -	- ditto -	24
„ W. H. Stanes -	- ditto -	12
Colonel R. Cocper -	Kotagherry -	12
Mr. F. Cockburn -	- ditto -	12
Colonel Woodfall -	Coonoor -	12
Mr. C. Anderson -	- ditto -	24

TABLE IV.—Memorandum of Chinchona Plants Distributed—*continued*.

NAMES.	STATION.	Number of Plants.	REMARKS.
Colonel Angelo - - - -	Ootacamund - -	12	
Rev. E. Laseron - - - -	- ditto - - -	12	
Captain R. N. Taylor - - -	Coorg - - -	96	
Major W. Agnew - - - -	Assam - - -	139	
Mr. V. H. Levinge - - - -	Madura - - -	12	
Chief Commissioner - - -	Nagpore - - -	28	
Mr. Fletcher - - - -	Ootacamund - -	24	
Gool Mahomed - - - -	- ditto - - -	20	
General McCleverty - - -	New Zealand - -	23	
Mr. W. Robinson - - - -	Kotagherry - -	6	
„ Crake - - - -	Wainad - - -	12	
„ H. R. Dawson - - - -	Seegoor - - -	12	
Captain Mann - - - -	Coorg - - -	36	
Mr. E. Roberts - - - -	Ootacamund - -	6	
„ H. Rossall - - - -	Wainad - - -	12	
Rev. Wait - - - -	Coonoor - - -	2	
M. H. de Facien - - - -	Katarry - - -	2,761	
Collector of - - - -	Belgaum - - -	28	
Collector of - - - -	Honore - - -	28	
Dr. Ross - - - -	- ditto - - -	15	
His Excellency the Governor -	Bombay - - -	158	
M. A. Hinde - - - -	Wainad - - -	12	
„ E. B. Thomas - - - -	Coonoor - - -	12	
Rajah of - - - -	Poonganoor - -	12	
TOTAL Number of Plants - -		7,532	

Ootacamund,
6th January 1863.

(signed) *W. G. McIvor*,
Superintendent Government, Chinchona Plantations.

— No. 18. —

From the Government of Madras to the Secretary of State for India.

Madras, 23 February 1864.

WE have the honour to forward for your information the accompanying Tabular Report on the Number, Condition, &c., of the Chinchona Plants on the Neilgherries on the 31st January 1864.

Enclosure in No. 18.

REPORT on the Number, Distribution, and Condition of Chinchona Plants on the Neilgherries, on 31st January 1864.

Botanical Names.	Commercial Names.	Number of Plants.	Value per Lb. of Dry Bark in the London Market.	REMARKS.
<i>C. succirubra</i> - -	Red Bark - -	88,424	<i>s. d.</i> 2 6 to <i>s. d.</i> 8 9	The number of plants permanently planted out remain as formerly, viz., 66,622.
<i>C. oalisaya</i> - -	Yellow Bark - -	1,766	2 10 to 7 -	
<i>C. officinalis</i> var. <i>Condaminea</i> (<i>C. Uritus</i> <i>singa</i>).	Original Loxa Bark -	6,434	2 10 to 7 -	The increase by propagation during the month is 16,117, being 633 plants under the average results of the last six months, making the total number of plants at the end of the month 291,607.
<i>C. officinalis</i> var. <i>Bonplandiana</i> (<i>C. Chahuarguera</i>).	Select Crown Bark -	168,518	2 10 to 7 -	
<i>C. crespilla</i> - -	Fine Crown Bark -	1,589	2 10 to 6 -	
<i>C. lancifolia</i> - -	Pitayo Bark - -	6	1 8 to 2 10	
<i>C. nitida</i> - -	Genuine Grey Bark -	8,406	1 8 to 2 9	
<i>C. Species</i> without name.	Fine Grey Bark -	2,745	1 8 to 2 10	
<i>C. micrantha</i> - -	Grey Bark - -	10,145	1 8 to 2 9	
<i>C. Peruviana</i> - -	Finest Grey Bark -	3,149	1 8 to 2 10	
<i>C. Pahudiana</i> - -	Unknown - -	425	Worthless.	
TOTAL Number of Plants - - -		291,607		

TABLE II.

MORANDUM of the Growth of Eleven Plants of *C. succirubra*, planted on the Second Denison Plantation, at Neddivuttum, on 30th August 1862.

Number of Plants.	Height in Inches when Planted on the 30th August 1862.	Height in Inches on the 31st December 1863.	Height in Inches on the 31st January 1864.	Growth in Inches during January 1864.	By whom Planted.
1	23	93	94	1	His Excellency Sir William Denison.
2	16½	86	86	0	
3	19	81	82	1	
4	15	86	87	1	
5	27	99	102	3	
6	20	74	74	0	J. W. Breeks, Esq.
7	20	90	91	1	
8	18	89	90	1	Dr. Sanderson.
9	20	89	89	0	J. D. Sim, Esq.
10	20	94	96	2	Lieutenant McLeod.
11	18	87	87	0	P. Grant, Esq.
12	0	21	28	7	Plant cut down for bark.

TABLE II. exhibits the growth of eleven plants planted out by His Excellency the Governor, and other gentlemen, at Neddivuttum, on the 30th August 1862. The average growth of these plants during the month is about 1 inch, or $\frac{3}{11}$ inches below the growth of last month.

One of the two plants cut down on the 20th of March last, for the bark submitted to Mr. Howard for analysis, has been injured by the frost, the tender points and young leaves being destroyed. This plant was placed on the highest and coldest point of the Neddivuttum Plantation (elevation 6,200 feet). The other plant planted at the lowest point of the plantation (elevation 4,900 feet) has made strong shoots of 28 inches in height, giving an average growth during the month of 7 inches or 5 inches above the average growth of last month.

TABLE III.

SHOWING the Height of Twelve Plants of *C. officinalis*, planted on the Dodabetta Plantations at Ootacamund, on 30th September 1863.

Number of Plants.	Height in Inches when Planted on the 30th September 1863.	Height in Inches on the 31st December 1863.	Height in Inches on the 31st January 1864.	Growth in Inches during January 1864.	REMARKS.
1	19	28	31½	3½	The twelve plants of <i>Chinchona officinalis</i> (a shrubby species) on the Dodabetta Plantations gives an average growth of 3 inches during the month, or ¼ inch above the growth of last month.
2	14½	22	25	3	
3	28	41	44½	3½	
4	22	30	33	3	
5	21½	29	31½	2½	
6	28	38	40½	2½	
7	22½	29½	32½	3	
8	21½	32½	35	2½	
9	21½	32	35½	3½	
10	19½	29	32½	3½	
11	24	31	34½	3½	
12	24	30	32½	2½	

TABLE IV.

MEMORANDUM of *Chinchona* Plants Distributed.

NAMES.	STATION.	Number of Plants.
Mr. F. N. Maltby - - - -	Travancore - - -	16
Dr. Junghuhn - - - -	Java - - -	56
Mr. A. R. Lascelles - - - -	Ootacamund - - -	12
Mr. M. Anderson - - - -	Jamaica - - -	2
Dr. Wiehe - - - -	Bombay - - -	10
Dr. T. Anderson - - - -	Calcutta - - -	554
Dr. Jamieson - - - -	Saharanpore - - -	107
Professor Lees - - - -	Calcutta - - -	61
Rajah of - - - -	Travancore - - -	521
Major Morgan - - - -	Ootacamund - - -	216
Mr. E. T. Fitzgerald - - - -	Calcutta - - -	261
Mr. J. W. Money - - - -	- ditto - - -	581
Dr. W. Bourne - - - -	- ditto - - -	420
Captain Cox - - - -	Wainad - - -	6
Mr. Hallock - - - -	- ditto - - -	2
Mr. T. Sheffield - - - -	Ootacamund - - -	2
Dr. F. Day - - - -	Cochin - - -	100
Mr. Brown - - - -	Tellicherry - - -	12
Mr. J. Hall - - - -	Ootacamund - - -	144
Mr. J. Knop - - - -	- ditto - - -	18
Captain Lees - - - -	Bengal - - -	281
Mr. W. H. Rayne - - - -	Manantoddy - - -	24
Reverend Sawyer - - - -	Ootacamund - - -	18
Mr. Friend - - - -	- ditto - - -	12
Mr. Hallock - - - -	- ditto - - -	1
Mr. Perie - - - -	Seegoor - - -	12
Colonel Scott - - - -	Ootacamund - - -	212
Mr. F. Berend - - - -	Cachar - - -	275
Reverend J. Hunter - - - -	Coonoor - - -	12
Mr. J. Mullaly - - - -	- ditto - - -	24
Mr. W. H. Stanes - - - -	- ditto - - -	12
Colonel R. Cooper - - - -	Kotagerry - - -	12
Mr. F. Cockburn - - - -	- ditto - - -	12
Colonel Woodfall - - - -	Coonoor - - -	12
Mr. C. Anderson - - - -	- ditto - - -	24
Colonel Angelo - - - -	Ootacamund - - -	12
Reverend E. Laseon - - - -	- ditto - - -	12
Captain R. N. Taylor - - - -	Coorg - - -	96
Major W. Agnew - - - -	Assam - - -	139
Mr. V. H. Levinge - - - -	Madura - - -	12
Chief Commissioner - - - -	Nagpore - - -	28
Mr. Fletcher - - - -	Ootacamund - - -	24
Gool Mahomed - - - -	- ditto - - -	20

The number of plants issued to the public is 1,593, making the total number of plants distributed 9,125.

The cold and draught of this month has been unusually severe, and accompanied by high, parching winds, and the effect on the plants is very interesting and instructive. The *Chinchona Succirubra*, at elevations above 5,600 feet, have entirely ceased to grow, and assume the appearance of plants wintering, or in a state of rest; under this elevation there has been a slight growth, increasing gradually as the elevation descends, until (as noted above) the extraordinary growth of 7 inches has been attained at the lowest elevation. The same effect has also been observed in our Dodabetta Plantation, the lowest part of which is 7,830 feet elevation, and the highest point 8,300 feet. Upon this site, both at high and low elevations, the *C. succirubra* and *micrantha*, &c., have assumed an entire state of rest, but being planted in sheltered positions have not suffered from the frost. The highest and most exposed parts of this site

TABLE IV.—Memorandum of Chinchona Plants Distributed—*continued*.

NAMES.	STATION.	Number of Plants.	REMARKS.
General McCleverty - - -	New Zealand - - -	23	are entirely occupied by the <i>C. officinalis</i> and its varieties; here the tender leaves and young shoots of a few of the plants have been injured by the frost; and the whole of the plants have assumed a state of rest, while at the lower elevation of 8,000 feet this hardy species begins to maintain its growth, until at 7,830 feet elevation the average growth of 3 inches has been attained.
Mr. W. Robinson - - -	Kotagherry - - -	6	
" Crake - - -	Wainad - - -	12	
" H. R. Dawson - - -	Seegoor - - -	12	
Captain Mann - - -	Coorg - - -	36	
Mr. E. Roberts - - -	Ootacamund - - -	6	
" H. Rossall - - -	Wainad - - -	12	
Rev. — Wait - - -	Coonoor - - -	2	
Mr. H. de Facien - - -	Katarry - - -	2,761	
Collector of - - -	Belgaum - - -	28	
Collector of - - -	Honore - - -	28	
Dr. Ross - - -	- ditto - - -	15	
His Excellency the Governor of - - -	Bombay - - -	158	
Mr. A. Hinde - - -	Wainad - - -	12	
" E. B. Thomas - - -	Coonoor - - -	12	
Rajah of - - -	Poonganoor - - -	12	
Dr. Bourne - - -	Calcutta - - -	112	
Messrs. Thomson, Shaw & Co. - - -	- ditto - - -	28	
Mr. T. H. Transon - - -	- ditto - - -	31	
Professor Lees - - -	- ditto - - -	486	
Dr. Mueller - - -	Melbourne - - -	28	
Mr. Tyrrell - - -	Mysore - - -	12	
Dr. Sayers - - -	Vellore - - -	12	
Mr. H. de Facien - - -	Katarry - - -	884	
TOTAL Number of Plants - - -		9,125	

Ootacamund,
10 February 1864.

(signed) *W. G. McIvor*,
Superintendent Government Chinchona Plantations.

— No. 19. —

From the Government of Madras to the Secretary of State for India.

Madras, 11 March 1864.

WE have the honour to forward for your information the accompanying Tabular Report on the number, condition, &c. of the Chinchona plants on the Neilgherries on the 29th February 1864.

Enclosure in No. 19.

REPORT on the Number, Distribution, and Condition of Chinchona Plants on the Neilgherries, on the 29th February 1864.

No. of Species.	Botanical Names.	Commercial Names.	Number of Plants.	Value per Lb. of Dry Bark in the London Market.	REMARKS.
1	<i>C. succirubra</i> - -	Red Bark - -	94,547	<i>s. d.</i> 2 6 to 8 9	The number of plants permanently planted out remain as formerly, viz., 66,622.
2	<i>C. Calisaya</i> - -	Yellow Bark - -	1,841	2 10 to 7 -	
3	<i>C. officinalis</i> , var. <i>Condaminea</i> (<i>C. Uritusinga</i>). - -	Original Loxa Bark - -	6,744	2 10 to 7 -	
4	<i>C. officinalis</i> , var. <i>Bonplandiana</i> (<i>C. Chahuarguera</i>). - -	Select Crown Bark - -	1,92,339	2 10 to 7 -	The increase by propagation during the month is 32,408, being 13,864 plants above the average results of the last six months, making the total number of plants at the end of the month 3,22,315.
5	<i>C. crespilla</i> - -	Fine Grey Bark - -	1,620	2 10 to 6 -	
6	<i>C. lancifolia</i> - -	Pitayo Bark - -	6	1 8 to 2 10	
7	<i>C. nitida</i> - -	Genuine Grey Bark - -	8,419	1 8 to 2 9	
8	<i>C. Species</i> without name. - -	Fine Bark - -	2,760	1 8 to 2 10	
9	<i>C. micrantha</i> - -	Grey Bark - -	10,450	1 8 to 2 9	Worthless.
10	<i>C. Peruviana</i> - -	Finest Grey Bark - -	3,164	1 8 to 2 10	
11	<i>C. Pahudiana</i> - -	Unknown - -	425		
TOTAL Number of Plants - - -			3,22,315		

TABLE II.

MEMORANDUM of the Growth of Eleven Plants of *C. succirubra*, planted on the Second Denison Plantation, at Neddivuttum, on the 30th August 1862.

Number of Plants.	Height in Inches when Planted, on 30 August 1862.	Height in Inches on 31 January 1864.	Height in Inches on 29 February 1864.	Growth in Inches during February 1864.	By whom Planted.	REMARKS.
1	23	94	94	0	His Excellency Sir W. Denison.	TABLE II. exhibits the growth of 11 plants planted out by his Excellency the Governor, and other gentlemen, at Neddivuttum, on the 30th August 1862. The average growth of these plants during the month is about $\frac{1}{4}$ inch, or $\frac{3}{4}$ inch under the average growth of last month.
2	16 $\frac{1}{2}$	86	87	1		
3	19	82	82	0		
4	15	87	87 $\frac{3}{4}$	$\frac{3}{4}$		
5	27	102	102 $\frac{1}{2}$	$\frac{1}{2}$		
6	20	74	74	0	J. W. Breeks, Esq. Dr. Sanderson.	
7	20	91	91	0		
8	16	90	90	0	J. D. Sim, Esq. Lieutenant McLeod.	
9	20	89	89	0		
10	20	96	97	1	P. Grant, Esq.	
11	18	87	87	0		
12	0	28	30	2	Plant cut down for bark.	

TABLE III.

SHOWING the Height of Twelve Plants of *C. officinalis*, planted on the Dodabetta Plantations, at Ootacamund, on the 30th September 1863.

Number of Plants.	Height in Inches when Planted on 30 September 1863.	Height in Inches on 31 January 1864.	Height in Inches on 29 February 1864.	Growth in Inches during February 1864.	REMARKS.
1	19	31 $\frac{1}{2}$	34 $\frac{1}{2}$	3	One of the two plants (that uninjured by the frost) cut down on the 20th of March last, for the bark, submitted to Mr. Howard for analysis, has made strong shoots of 30 inches in height, giving an average growth during the month of two inches, or five inches under the growth of last month.
2	14 $\frac{1}{2}$	25	28	3	
3	28	44 $\frac{1}{2}$	46	1 $\frac{1}{2}$	
4	22	33	37	4	
5	21 $\frac{1}{2}$	31 $\frac{1}{2}$	35	3 $\frac{1}{2}$	
6	28	40 $\frac{1}{2}$	46	5 $\frac{1}{2}$	
7	22 $\frac{1}{2}$	32 $\frac{1}{2}$	35	2 $\frac{1}{2}$	
8	21 $\frac{1}{2}$	35	38	3	
9	21 $\frac{1}{2}$	35 $\frac{1}{2}$	40	4 $\frac{1}{2}$	
10	19 $\frac{1}{2}$	32 $\frac{1}{2}$	37	4 $\frac{1}{2}$	
11	24	34 $\frac{1}{2}$	38	3 $\frac{1}{2}$	
12	24	32 $\frac{1}{2}$	36	3 $\frac{1}{2}$	

TABLE IV.

MEMORANDUM of Chinchona Plants Distributed.

NAMES.	STATION.	Number of Plants.
Mr. F. N. Malthy -	Travancore -	16
Dr. Junghuhn -	Java -	56
Mr. A. R. Lascelles -	Ootacamund -	12
Mr. M. Anderson -	Jamaica -	2
Dr. Wiehe -	Bombay -	10
Dr. T. Anderson -	Calcutta -	554
Dr. Jamieson -	Saharanpore -	107
Professor Lees -	Calcutta -	547
Rajah of -	Travancore -	521
Major Morgan -	Ootacamund -	216
Mr. E. T. Fitzgerald -	Calcutta -	405
Mr. J. W. Money -	- ditto -	581
Dr. W. Bourne -	- ditto -	532
Captain Cox -	Wainad -	6
Mr. Hallock -	- ditto -	2
Mr. T. Sheffield -	Ootacamund -	12
Dr. F. Day -	Cochin -	100

The 12 plants of *Chinchona officinalis* (a shrubby species) on the Dodabetta Plantation, gives an average growth of 3 $\frac{1}{2}$ inches during the month, or $\frac{1}{2}$ an inch above the growth of last month.

The number of plants issued to the public is 1,700, making the total number of plants distributed 10,825.

The strong and dry winds which prevailed almost continuously throughout the month at Neddivuttum, has retarded the growth of the plants as effectually as the cold weather in January. The increase in temperature, however, which took place towards the end of the

TABLE IV.—MEMORANDUM of Chinchona Plants Distributed—*continued*.

NAMES.	STATION.	Number of Plants.	REMARKS.
Mr. Brown - - - - -	Tellicherry - -	12	month has proved highly beneficial to our propagating operations.
Mr. J. Hall - - - - -	Ootacamund - -	144	
Mr. J. Knop - - - - -	- ditto - - -	18	
Captain Lees - - - - -	Bengal - - -	281	
Mr. W. H. Rayne - - - - -	Manantoddy - -	24	
Reverend — Sawyer - - - - -	Ootacamund - -	18	
Mr. Frend - - - - -	- ditto - - -	12	
Mr. Hallock - - - - -	- ditto - - -	1	
Mr. J. Perie - - - - -	Seegoor - - -	12	
Colonel Scott - - - - -	Ootacamund - -	212	
Mr. F. Berend - - - - -	Cachar - - -	275	
Rev. J. Hunter - - - - -	Coonoor - - -	12	
Mr. J. Mullaly - - - - -	- ditto - - -	24	
Mr. W. H. Stanes - - - - -	- ditto - - -	12	
Colonel R. Cooper - - - - -	Kotagherry - -	12	
Mr. F. Cockburn - - - - -	- ditto - - -	12	
Colonel Woodfall - - - - -	Coonoor - - -	12	
Mr. C. Anderson - - - - -	- ditto - - -	24	
Colonel Angelo - - - - -	Ootacamund - -	12	
Rev. E. Laseron - - - - -	- ditto - - -	12	
Capt. R. N. Taylor - - - - -	Coorg - - -	96	
Major W. Agnew - - - - -	Assam - - -	139	
Mr. V. H. Levinge - - - - -	Madura - - -	12	
Chief Commissioner - - - - -	Nagpore - - -	28	
Mr. Fletcher - - - - -	Ootacamund - -	24	
Gool Mahomed - - - - -	- ditto - - -	20	
General McCleverty - - - - -	New Zealand - -	23	
Mr. W. Robinson - - - - -	Kotagherry - -	6	
Mr. Crake - - - - -	Wainad - - -	12	
Mr. H. R. Dawson - - - - -	Seegoor - - -	12	
Captain Mann - - - - -	Coorg - - -	48	
Mr. E. Roberts - - - - -	Ootacamund - -	6	
Mr. H. Russall - - - - -	Wainad - - -	12	
Rev. — Wait - - - - -	Coonoor - - -	2	
Mr. H. de Facien - - - - -	Katary - - -	5,189	
Collector of - - - - -	Belgaum - - -	28	
Collector of - - - - -	Honore - - -	28	
Dr. Ross - - - - -	- ditto - - -	15	
His Excellency the Governor of - - - - -	Bombay - - -	158	
Mr. A. Hinde - - - - -	Wainad - - -	12	
Mr. E. B. Thomas - - - - -	Coonoor - - -	12	
Rajah of - - - - -	Poonganoor - -	12	
Messrs. Thomson, Shaw, & Co. - - - - -	- ditto - - -	28	
Mr. T. H. Trinson - - - - -	- ditto - - -	31	
Dr. Miller - - - - -	Melbourne - -	28	
Mr. Tyrrell - - - - -	Mysore - - -	12	
Dr. Sayer - - - - -	Vellore - - -	12	
TOTAL Number of Plants - - -		10,825	

Ootacamund,
8 March 1864.

(signed) *W. G. McIvor*,
Superintendent Government Chinchona Plantations.

— No. 20. —

From the Government of Madras to the Secretary of State for India.

Madras, 13 April 1864.

WE have the honour to forward for your information the accompanying tabular report on the number, condition, &c., of the Chinchona plants on the Neilgherries on the 31st March 1864.

Enclosure in No. 20.

REPORT on the Number, Distribution, and Condition of Chinchona Plants on the Neilgherries, on the 31st March 1864.

No. of Species.	Botanical Names.	Commercial Names.	Number of Plants.	Value per Lb. of Dry Bark in the London Market.		REMARKS.
				s. d.	s. d.	
1	C. succirubra - -	Red Bark - -	97,918	2 6	to 8 9	The number of plants permanently planted out remain as formerly, viz., 66,622.
2	C. Calisaya - -	Yellow Bark - -	1,871	2 10	to 7 -	
3	C. officinalis, var. Condaminea (C. Uritusinga).	Original Loxa Bark -	6,592	2 10	to 7 -	
4	Ditto var. Bonplandiana (C. Chahuarguera).	Select Crown Bark -	2,08,465	2 10	to 7 -	The increase by propagation during the month is 20,118, being 1,574 plants above the average of the last six months, making the total number of plants at the end of March, 3,41,865.
5	C. crespilla - -	Fine Grey Bark -	1,618	2 10	to 6 -	
6	C. lancifolia - -	Pitayo Bark - -	8	1 8	to 2 10	
7	C. nitida - -	Genuine Grey Bark -	8,419	1 8	to 2 9	
8	C. Species without name - -	Fine Bark - -	2,760	1 8	to 2 10	
9	C. micrantha - -	Grey Bark -	10,627	1 8	to 2 9	
10	C. Peruviana - -	Finest Grey Bark -	3,164	1 8	to 2 10	
11	C. Pahudiana - -	Unknown - -	425	Worthless.		
TOTAL Number of Plants - -			3,41,865			

TABLE II.

MEMORANDUM of the Growth of Eleven Plants of *C. succirubra*, planted on the Second Denison Plantation, at Neddivuttum, on the 30th August 1862.

Number of Plants.	Height in Inches when Planted, on the 30th August 1862.	Height in Inches on the 29th February 1864.	Height in Inches on the 31st March 1864.	Growth in Inches during March 1864.	By whom Planted.
1	23	94	94	0	His Excellency Sir W. Denison.
2	16½	87	88	1	
3	19	82	85	3	
4	15	87½	87½	0	
5	27	102½	102½	0	
6	20	74	75	1	J. W. Breeks, Esq. Dr. Sanderson. J. D. Sim, Esq. Lieutenant McLeod. P. Grant, Esq. Plant cut down for bark.
7	20	91	93	2	
8	18	90	91	1	
9	20	89	91	2	
10	20	97	98	1	
11	18	87	88	1	
12	0	30	30	0	

TABLE II. exhibits the growth of eleven plants of *C. succirubra* planted out by his Excellency the Governor and other gentlemen at Neddivuttum, on the 30th August 1862. The average growth of these plants during the month is 1½ inches, or about ¾ of an inch above the average growth of last month.

One of the two plants cut down on the 20th of March last, for the bark, submitted to Mr. Howard for analysis, has made strong shoots of 30 inches in height.

TABLE III.

SHOWING the Height of Twelve Plants of *C. officinalis*, planted on the Dodabetta Plantation, at Ootacamund, on the 30th September 1863.

Number of Plants.	Height in Inches when Planted on the 30th September 1863.	Height in Inches on the 29th February 1864.	Height in Inches on the 31st March 1864.	Growth in Inches during the Month.	REMARKS.
1	19	34½	38	3½	The 12 plants of <i>Chinchona officinalis</i> (a shrubby species) on the Dodabetta Plantation gives an average growth of 3½ inches, or the same as last month.
2	14½	28	30½	2½	
3	28	46	48½	2½	
4	22	37	40½	3½	
5	21½	35	37½	2½	
6	28	46	48	2	
7	22½	35	39	4	
8	21½	38	42	4	
9	21½	40	44	4	
10	19½	37	42	5	
11	24	48	42	4	
12	24	36	40½	4½	

TABLE IV.
REGISTER of Chichona Plants distributed.

NAMES.	STATIONS.	Number of Plants.	REMARKS.
Mr. F. N. Maltby - - -	Travancore - - -	16	The number of plants issued to the public is 568, making the total number of plants distributed 11,393.
Dr. Junghuhn - - -	Java - - -	56	
Mr. A. R. Lascelles - - -	Ootacamund - - -	12	The drought being unusually severe, it was found necessary about the middle of the month, to water the plants by hand, a tedious and expensive operation, which, fortunately, it was not necessary to continue for any length of time, as fine showers fell on the 30th and 31st.
" M. Anderson - - -	Jamaica - - -	2	
Dr. Wiehe - - -	Bombay - - -	10	The dry season just passed, has been the most severe experienced for 15 years; not a drop of rain having fallen between the 8th December and 30th March.
Dr. T. Anderson - - -	Calcutta - - -	554	
" Jamieson - - -	Saharanpore - - -	107	The dry season just passed, has been the most severe experienced for 15 years; not a drop of rain having fallen between the 8th December and 30th March.
Professor Lees - - -	Calcutta - - -	547	
Rajah of - - -	Travancore - - -	521	The dry season just passed, has been the most severe experienced for 15 years; not a drop of rain having fallen between the 8th December and 30th March.
Major Morgan - - -	Ootacamund - - -	216	
Mr. E. T. Fitzgerald - - -	Calcutta - - -	405	The dry season just passed, has been the most severe experienced for 15 years; not a drop of rain having fallen between the 8th December and 30th March.
Mr. J. W. Money - - -	- ditto - - -	581	
Dr. W. Bourne - - -	- ditto - - -	532	The dry season just passed, has been the most severe experienced for 15 years; not a drop of rain having fallen between the 8th December and 30th March.
Captain Cox - - -	Wainad - - -	6	
Mr. Hallock - - -	- ditto - - -	2	The dry season just passed, has been the most severe experienced for 15 years; not a drop of rain having fallen between the 8th December and 30th March.
" T. Sheffield - - -	Ootacamund - - -	12	
" F. Day - - -	Cochin - - -	100	The dry season just passed, has been the most severe experienced for 15 years; not a drop of rain having fallen between the 8th December and 30th March.
" Brown - - -	Tellicherry - - -	12	
" J. Hall - - -	Ootacamund - - -	144	The dry season just passed, has been the most severe experienced for 15 years; not a drop of rain having fallen between the 8th December and 30th March.
" J. Knop - - -	- ditto - - -	18	
Captain Lees - - -	Bengal - - -	281	The dry season just passed, has been the most severe experienced for 15 years; not a drop of rain having fallen between the 8th December and 30th March.
Mr. W. H. Rayne - - -	Manantoddy - - -	24	
Rev. Sawyer - - -	Ootacamund - - -	18	The dry season just passed, has been the most severe experienced for 15 years; not a drop of rain having fallen between the 8th December and 30th March.
Mr. Friend - - -	- ditto - - -	12	
" Hallock - - -	- ditto - - -	1	The dry season just passed, has been the most severe experienced for 15 years; not a drop of rain having fallen between the 8th December and 30th March.
" J. Perie - - -	Seegoor - - -	12	
Colonel Scott - - -	Ootacamund - - -	724	The dry season just passed, has been the most severe experienced for 15 years; not a drop of rain having fallen between the 8th December and 30th March.
Mr. F. Berend - - -	Cachar - - -	275	
Rev. J. Hunter - - -	Coonoor - - -	12	The dry season just passed, has been the most severe experienced for 15 years; not a drop of rain having fallen between the 8th December and 30th March.
Mr. J. Mullaly - - -	- ditto - - -	24	
" W. H. Stanes - - -	- ditto - - -	12	The dry season just passed, has been the most severe experienced for 15 years; not a drop of rain having fallen between the 8th December and 30th March.
Colonel R. Cooper - - -	Kotagheny - - -	12	
Mr. F. Cockburn - - -	- ditto - - -	12	The dry season just passed, has been the most severe experienced for 15 years; not a drop of rain having fallen between the 8th December and 30th March.
Colonel Woodfall - - -	Coonoor - - -	12	
Mr. C. Anderson - - -	- ditto - - -	24	The dry season just passed, has been the most severe experienced for 15 years; not a drop of rain having fallen between the 8th December and 30th March.
Colonel Angelo - - -	Ootacamund - - -	12	
Rev. E. Laceron - - -	- ditto - - -	12	The dry season just passed, has been the most severe experienced for 15 years; not a drop of rain having fallen between the 8th December and 30th March.
Captain R. N. Taylor - - -	Coorg - - -	96	
Major W. Agnew - - -	Assam - - -	139	The dry season just passed, has been the most severe experienced for 15 years; not a drop of rain having fallen between the 8th December and 30th March.
Mr. V. H. Levigne - - -	Madura - - -	12	
Chief Commissioner - - -	Nagpore - - -	28	The dry season just passed, has been the most severe experienced for 15 years; not a drop of rain having fallen between the 8th December and 30th March.
Mr. Fletcher - - -	Ootacamund - - -	24	
Gool Mahomed - - -	- ditto - - -	20	The dry season just passed, has been the most severe experienced for 15 years; not a drop of rain having fallen between the 8th December and 30th March.
General McCleverty - - -	New Zealand - - -	23	
Mr. W. Robinson - - -	Kotagherry - - -	6	The dry season just passed, has been the most severe experienced for 15 years; not a drop of rain having fallen between the 8th December and 30th March.
" Crake - - -	Wainad - - -	12	
" H. R. Dawson - - -	Seegoor - - -	12	The dry season just passed, has been the most severe experienced for 15 years; not a drop of rain having fallen between the 8th December and 30th March.
Captain Mann - - -	Coorg - - -	48	
Mr. E. Roberts - - -	Ootacamund - - -	6	The dry season just passed, has been the most severe experienced for 15 years; not a drop of rain having fallen between the 8th December and 30th March.
" H. Russell - - -	Wainad - - -	12	
Rev. Wait - - -	Coonoor - - -	2	The dry season just passed, has been the most severe experienced for 15 years; not a drop of rain having fallen between the 8th December and 30th March.
Mr. H. de Facien - - -	Katary - - -	5,189	
Collector of Belgaum - - -	Belgaum - - -	28	The dry season just passed, has been the most severe experienced for 15 years; not a drop of rain having fallen between the 8th December and 30th March.
Collector of Honore - - -	Honore - - -	28	
Dr. Ross - - -	- ditto - - -	15	The dry season just passed, has been the most severe experienced for 15 years; not a drop of rain having fallen between the 8th December and 30th March.
His Excellency the Governor of - - -	Bombay - - -	158	
Mr. H. Hinde - - -	Wainad - - -	12	The dry season just passed, has been the most severe experienced for 15 years; not a drop of rain having fallen between the 8th December and 30th March.
" E. B. Thomas - - -	Coonoor - - -	12	
Rajah of Poonganoor - - -	Poonganoor - - -	12	The dry season just passed, has been the most severe experienced for 15 years; not a drop of rain having fallen between the 8th December and 30th March.
Messrs. Thomson, Shaw & Co. - - -	- ditto - - -	28	
Mr. J. H. Trinson - - -	- ditto - - -	31	The dry season just passed, has been the most severe experienced for 15 years; not a drop of rain having fallen between the 8th December and 30th March.
Dr. Muller - - -	Melbourne - - -	28	
Mr. Tyrrell - - -	Mysore - - -	12	The dry season just passed, has been the most severe experienced for 15 years; not a drop of rain having fallen between the 8th December and 30th March.
Dr. Sayers - - -	Vellore - - -	12	
Major Taylor - - -	Ootacamund - - -	50	The dry season just passed, has been the most severe experienced for 15 years; not a drop of rain having fallen between the 8th December and 30th March.
Dr. Wilson - - -	- ditto - - -	6	
Total Number of Plants - - -		11,393	

— No. 21. —

From the Government of Madras to the Secretary of State for India.

Madras, 19 May 1864.

WE have the honour to forward for your information the accompanying Tabular Report on the Number, Condition, &c., of the Chinchona Plants on the Neilgherries on the 30th April 1864.

Enclosure in No. 21.

REPORT on the Number, Distribution, and Condition of Chinchona Plants on the Neilgherries, on 30 April 1864.

Species.	Botanical Names.	Commercial Names.	Number of Plants.	Value per lb. of Dry Bark in the London Market.	REMARKS.
				<i>s. d.</i> <i>s. d.</i>	
1	<i>C. succirubra</i> - -	Red Bark - -	91,046	2 6 to 8 9	The weather being favourable, planting operations have been commenced, the number of plants planted out on the plantations during the month is 52,300, making the total 118,922.
2	<i>C. Calisaya</i> - -	Yellow Bark - -	1,993	2 10 to 7 -	
3	<i>C. officinalis</i> , var. <i>Condaminea</i> (<i>C. Uritusinga</i>).	Original Loxa Bark	3,448	2 10 to 7 -	
4	<i>Do.</i> var. <i>Bonplandiana</i> (<i>C. Chahuarguera</i>).	Select Brown Bark -	227,195	2 10 to 7 -	
5	<i>C. crespilla</i> - -	Fine Grey Bark - -	1,728	2 10 to 6 -	The increase by propagation is 28,988, being 9,737 plants above the average of the last six months, making the total number of plants at the end of the month 351,125.
6	<i>C. lancifolia</i> - -	Pitayo Bark - -	8	1 8 to 2 10	
7	<i>C. nitida</i> - -	Genuine Grey Bark	8,425	1 8 to 2 9	
8	<i>C. Species</i> without name.	Fine Bark - -	2,769	1 8 to 2 10	
9	<i>C. micrantha</i> - -	Grey Bark - -	10,913	1 8 to 2 9	
10	<i>C. Peruviana</i> - -	Finest Grey Bark -	3,175	1 8 to 2 10	
11	<i>C. Pabudiana</i> - -	Unknown - -	425	Unknown.	
TOTAL Number of Plants - - -			351,125		

TABLE II.

MEMORANDUM of the Growth of Eleven Plants of *C. succirubra*, planted on the Second Denison Plantation, at Neddivuttum, on 30 August 1862.

Number of Plants.	Height in Inches when Planted, 30 August 1862.	Height in Inches on 31 March 1864.	Height in inches on 30 April 1864.	Growth in Inches during April 1864.	By Whom Planted.
1	23	94	97	3	His Excellency Sir W. Denison.
2	16½	88	89	1	
3	19	85	85½	0½	
4	15	87¾	88½	0¾	
5	27	102½	104	1½	J. W. Brecks, Esq.
6	20	75	76	1	
7	20	93	95	2	
8	18	91	92	1	
9	20	91	92	1	J. D. Sim, Esq.
10	20	98	100	2	Lieutenant McLeod.
11	18	80	88½	0½	P. Grant, Esq.
12	0	30	31½	1½	Plant cut down for bark.

TABLE II. exhibits the growth of eleven plants of *C. succirubra*, planted out by His Excellency the Governor and other gentlemen at Neddivuttum, on the 30th August 1862. The average growth of these plants during the month is about 1¼ inches, or the same as last month.

One of the two plants cut down on the 20th of March 1863 for the bark, submitted to Mr. Howard for analysis, has made strong shoots of 31½ inches in height, giving the growth of 1½ inches during the month.

TABLE III.

SHOWING the Height of Twelve Plants of *C. officinalis*, planted on the Dodabetta Plantation at Ootacamund on 30 September 1863.

Number of Plants.	Height in Inches when Planted, on 30 September 1863.	Height in Inches on 31 March 1864.	Height in Inches on 30 April 1864.	Growth in Inches during April 1864.	REMARKS.
1	19	38	41½	3½	The 12 plants of <i>Chinchona officinalis</i> (a shrubby species) on the Dodabetta plantation gives an average growth of 3½ inches, or the same as last month.
2	14½	30½	34	3½	
3	28	48½	51	2½	
4	22	40½	44	3½	
5	21½	37½	40½	3	
6	28	48	51	3	
7	22½	39	43	4	
8	21½	42	45½	3½	
9	21½	44	47½	3½	
10	19½	42	46½	4½	
11	24	42	46	4	
12	24	40½	44½	4	

TABLE IV.

REGISTER of Chinchona Plants Distributed.

The number of plants issued to the public is 19,730, making the total number of plants distributed 31,123.

NAMES.	STATION.	Number of Plants.
Mr. F. N. Maltby	Travancore	16
Dr. Junghun	Java	56
Mr. A. R. Lascelles	Ootacamund	12
Mr. M. Anderson	Jamaica	2
Dr. Wiehe	Bombay	10
Dr. T. Anderson	Calcutta	554
Dr. Jamieson	Saharanpore	107
Professor Lees	Calcutta	547
Rajah of Travancore	Travancore	521
Major Morgan	Ootacamund	1,534
Mr. E. T. Fitzgerald	Calcutta	405
Mr. J. W. Money	- ditto -	581
Dr. W. Bourne	- ditto -	532
Captain Cox	Wainad	6
Mr. Hallock	- ditto -	2
Mr. T. Sheffield	Ootacamund	12
Dr. F. Day	Cochin	100
Mr. Brown	Tillicherry	12
Mr. J. Hall	Ootacamund	144
Mr. J. Knop	- ditto -	18
Captain Lees	Bengal	281
Mr. W. H. Rayne	Manantoddy	24
Reverend Sawyer	Ootacamund	18
Mr. Friend	- ditto -	12
Mr. Hallock	- ditto -	1
Mr. J. Perie	Seegoor	12
Colonel Scott	Ootacamund	724
Mr. F. Berend	Cachar	275
Rev. J. Hunter	Coonoor	12
Mr. J. Mullaly	- ditto -	24
Mr. W. H. Stanes	- ditto -	12
Colonel R. Cooper	Kotagherry	12
Mr. F. Cockburn	- ditto -	12
Colonel Woodfall	Coonoor	12
Mr. C. Anderson	- ditto -	24
Colonel Angelo	Ootacamund	12
Rev. E. Laseron	- ditto -	12
Captain R. N. Taylor	Coorg	96
Major W. Agnew	Assam	139
Mr. V. H. Levinge	Madura	12
Chief Commissioner of Nagpore	Nagpore	28
Mr. Fletcher	Ootacamund	24
Gool Mahomed	- ditto -	20
General McCleverty	New Zealand	23
Mr. W. Robinson	Kotagherry	18
Mr. Crake.	Wainad	12

TABLE IV.—MEMORANDUM Chinchona Plants distributed, &c.—*continued*.

NAMES.	STATION.	Number of Plants.	REMARKS.
Mr. H. R. Dawson - - -	Seegoor - - -	12	
Captain Mann - - -	Coorg - - -	48	
Mr. E. Roberts - - -	Ootacamund - - -	6	
„ H. Russell - - -	Wainad - - -	12	
Rev. Wait - - -	Coonoor - - -	2	
Mr. H. de Facien - - -	Katary - - -	5,189	
Collector of Belgaum - - -	Belgaum - - -	28	
Collector of Honore - - -	Honore - - -	28	
Dr. Ross - - -	- ditto - - -	15	
His Excellency the Governor of Bombay.	Bombay - - -	158	
Mr. A. Hinde - - -	Wainad - - -	12	
„ E. B. Thomas - - -	Coonoor - - -	12	
Rajah of Poonganoor - - -	Poonganoor - - -	12	
Messrs. Thomson, Shaw, & Co. - - -	- ditto - - -	28	
Mr. T. H. Trimson - - -	- ditto - - -	31	
Dr. Miller - - -	Melbourne - - -	28	
Mr. Tyrrell - - -	Mysore - - -	12	
Dr. Sayers - - -	Vellore - - -	1,012	
Mr. Drummond - - -	Ootacamund - - -	224	
Major J. P. Taylor - - -	- ditto - - -	2,198	
Dr. Wilson - - -	- ditto - - -	6	
Captain Fuller - - -	Coonoor - - -	28	
Mr. Schnarie - - -	Ootacamund - - -	15,000	
TOTAL number of Plants - - -		31,123	

Ootacamund,
12 May 1864.

(signed) *W. G. McIvor*,
Superintendent Government Chinchona Plantations.

— No. 22. —

From the Government of Madras to the Secretary of State for India.

Madras, 14 June 1864.

WE have the honour to forward for your information the accompanying Tabular Report on the number, condition, &c., of the Chinchona plants on the Neilgherries on the 31 May 1864.

Enclosure in No. 22.

REPORT on the Number, Distribution, and Condition of Chinchona Plants on the Neilgherries on 31 May 1864.

No. of Species.	Botanical Names.	Commercial Names.	Number of Plants.	Value per lb. of Dry Bark in the London Market.	REMARKS.
1	<i>C. succirubra</i> - -	Red Bark - -	102,344	<i>s. d.</i> 2 6 to <i>s. d.</i> 8 9	The number of plants planted on the plantations during the month is 25,394; making the total 144,316 plants permanently planted out.
2	<i>C. Calisaya</i> - -	Yellow Bark - -	2,137	2 10 to 7 -	
3	<i>C. officinalis</i> , var. <i>Condaminea</i> (<i>C. Uritusinga</i>).	Original Loxa Bark	4,494	2 10 to 7 -	
4	<i>C. officinalis</i> , var. <i>Bonplandiana</i> (<i>C. Chahuarguera</i>).	Select Crown Bark -	232,980	2 10 to 7 -	The increase by propagation 19,661, being 1,939 plants under the average of the last six months. The total number of plants at the end of the month being 385,247.
5	<i>C. crespilla</i> - -	Fine Grey Bark -	1,927	2 10 to 6 -	
6	<i>C. lancifolia</i> - -	Pitayo Bark - -	12	1 8 to 10 -	
7	<i>C. nitida</i> - -	Genuine Grey Bark	8,426	1 8 to 9 -	
8	<i>C. Species without name.</i>	Fine Bark - -	2,769	1 8 to 10 -	
9	<i>C. micrantha</i> - -	Grey Bark - -	11,561	1 8 to 9 -	
10	<i>C. Peruviana</i> - -	Finest Grey Bark -	3,176	1 8 to 10 -	
11	<i>C. Pahudiana</i> - -	Unknown - -	425	Unknown.	
TOTAL Number of Plants - - -			385,247		

TABLE II.

MEMORANDUM of the Growth of Eleven Plants of *C. Succirubra*, planted on the 2d Denison Plantation, at Neddivuttum, on 30 August 1862.

Number of Plants.	Height in Inches when Planted on 30 August 1862.	Height in Inches on 30 April 1864.	Height in Inches on 31 May 1864.	Growth in Inches during May 1864.	By whom Planted.	REMARKS.
1	23	97	98	2	His Excellency Sir W. Denison.	TABLE II. exhibits the growth of eleven plants of <i>Chinchona suc- cirubra</i> planted out by his Excel- lency the Governor and other gentlemen at Neddivuttum on the 30th August 1862. The average growth of these plants during the month is $1\frac{5}{11}$ inches or about $\frac{1}{4}$ inch above the growth of last month.
2	$16\frac{1}{2}$	89	90	2		
3	19	$85\frac{1}{2}$	87	1		
4	15	$88\frac{1}{2}$	$91\frac{1}{2}$	$1\frac{1}{2}$		
5	27	104	106	3		
6	20	76	78	1	J. W. Breeks, Esq.	One of the plants cut down on the 20th of March 1863 for the bark submitted to Mr. Howard for analysis, has made strong shoots of 35 inches in height, giving the growth of $4\frac{1}{2}$ inches during the month, or three inches above the growth of last month.
7	20	95	96	1	Dr. Sanderson.	
8	18	92	93	1	J. D. Sim, Esq.	
9	20	92	94	2	Lieutenant McLeod.	
10	20	100	101	1	P. Grant, Esq.	
11	18	$88\frac{1}{2}$	89	$0\frac{1}{2}$	Plant cut down for bark	
12	0	$31\frac{1}{2}$	35	$4\frac{1}{2}$		

TABLE III.

SHOWING the Height of Twelve Plants of *C. officinalis* planted on the Dodabetta Plantation at Ootacamund on 30 September 1863.

Number of Plants.	Height in Inches when Planted on 30 September 1863.	Height in Inches on 30 April 1864.	Height in Inches on 31 May 1864.	Growth in Inches during May 1864.	REMARKS.
1	19	$41\frac{1}{2}$	44	$2\frac{1}{2}$	The twelve plants of <i>C. officinalis</i> (a shrubby species) on the Dodabetta plantation gives an average growth of $3\frac{1}{3}$ inches, or the same as last month.
2	$14\frac{1}{2}$	34	$37\frac{1}{2}$	$3\frac{1}{2}$	
3	28	51	54	3	
4	22	44	49	5	
5	$21\frac{1}{2}$	$40\frac{1}{2}$	44	$3\frac{1}{2}$	
6	28	51	54	3	
7	$22\frac{1}{2}$	43	$46\frac{1}{2}$	$3\frac{1}{2}$	
8	$21\frac{1}{2}$	$45\frac{1}{2}$	$48\frac{1}{2}$	3	
9	$21\frac{1}{2}$	$47\frac{1}{2}$	$52\frac{1}{2}$	5	
10	$19\frac{1}{2}$	$46\frac{1}{2}$	50	$3\frac{1}{2}$	
11	24	46	50	4	
12	$24\frac{1}{2}$	44	$47\frac{1}{2}$	3	

TABLE IV.

REGISTER of Chinchona Plants Distributed.

NAMES.	STATION.	No. of Plants.
Mr. F. N. Maltby	Travancore	16
Dr. Junghun	Java	56
Mr. A. R. Lascelles	Ootacamund	12
Mr. M. Anderson	Jamaica	2
Dr. Wiehe	Bombay	10
Dr. T. Anderson	Calcutta	554
Dr. Jamieson	Saharanpore	107
Professor Lees	Calcutta	547
Rajah of Travancore	Travancore	521
Major Morgan	Ootacamund	1,534
Mr. E. T. Fitzgerald	Calcutta	405
Mr. J. W. Money	ditto	581
Dr. W. Bourne	ditto	532
Captain Cox	Wainad	6

TABLE IV.—Register of Chinchona Plants Distributed—*continued*.

NAMES.	STATION.	Number of Plants.	REMARKS.
Mr. Hallock - - - -	Wainad - - - -	2	The number of plants issued to the public is 539, making the total number of plants distributed 31,662.
Mr. T. Sheffield - - - -	Ootacamund - - - -	12	
Dr. F. Day - - - -	Cochin - - - -	100	
Mr. Brown - - - -	Tellicherry - - - -	12	
Mr. J. Hall - - - -	Ootacamund - - - -	144	
Mr. J. Knop - - - -	- ditto - - - -	18	
Captain Lees - - - -	Bengal - - - -	281	
Mr. W. H. Rayne - - - -	Manantoddy - - - -	24	
Rev. — Sawyer - - - -	Ootacamund - - - -	1,018	
Mr. Frend - - - -	- ditto - - - -	12	
Mr. Hallock - - - -	- ditto - - - -	1	
Mr. J. Perie - - - -	Seegoor - - - -	12	
Colonel Scott - - - -	Ootacamund - - - -	1,024	
Mr. F. Berend - - - -	Cachar - - - -	275	
Rev. J. Hunter - - - -	Coonoor - - - -	12	
Mr. J. Mullaly - - - -	- ditto - - - -	24	
Mr. W. H. Stanes - - - -	- ditto - - - -	12	
Colonel R. Cooper - - - -	Kotagherry - - - -	12	
Mr. F. Cockburn - - - -	- ditto - - - -	12	
Colonel Woodfall - - - -	Coonoor - - - -	12	
Mr. C. Anderson - - - -	- ditto - - - -	24	
Colonel Angelo - - - -	Ootacamund - - - -	12	
Rev. E. Laceron - - - -	- ditto - - - -	12	
Captain R. N. Taylor - - - -	Coorg - - - -	96	
Major W. Agnew - - - -	Assam - - - -	139	
Mr. V. H. Levinge - - - -	Madura - - - -	12	
Chief Commissioner - - - -	Nagpore - - - -	28	
Mr. Fletcher - - - -	Ootacamund - - - -	24	
Gool Mahomed - - - -	- ditto - - - -	20	
General McCleverty - - - -	New Zealand - - - -	23	
Mr. W. Robinson - - - -	Kotagherry - - - -	18	
Mr. Crake - - - -	Wainad - - - -	12	
Mr. H. R. Dawson - - - -	Seegoor - - - -	12	
Captain Mann - - - -	Coorg - - - -	48	
Mr. E. Roberts - - - -	Ootacamund - - - -	6	
Mr. H. Russell - - - -	Wainad - - - -	12	
Rev. — Wait - - - -	Coonoor - - - -	2	
Mr. H. de Facien - - - -	Katary - - - -	5,189	
Collector of - - - -	Belgaum - - - -	28	
Collector of - - - -	Honore - - - -	28	
Dr. Ross - - - -	- ditto - - - -	15	
His Excellency the Governor of - - - -	Bombay - - - -	158	
Mr. H. Hinde - - - -	Wainad - - - -	12	
Mr. E. B. Thomas - - - -	Coonoor - - - -	12	
Rajah of Poonganoor - - - -	Poonganoor - - - -	12	
Messrs. Thomson, Shaw & Co. - - - -	- ditto - - - -	28	
Mr. J. H. Trinson - - - -	- ditto - - - -	31	
Dr. Muller - - - -	Melbourne - - - -	28	
Mr. Tyrrell - - - -	Mysore - - - -	12	
Dr. Sayers - - - -	Vellore - - - -	12	
Major Taylor - - - -	Ootacamund - - - -	2,198	
Doctor Wilson - - - -	- ditto - - - -	6	
Mr. Schnarie - - - -	- ditto - - - -	15,000	
Captain Fuller - - - -	Coonoor - - - -	28	
Mr. Drummond - - - -	Ootacamund - - - -	224	
Captain Jennings - - - -	- ditto - - - -	200	
Lieut. H. B. Montmorency - - - -	Bangalore - - - -	6	
Mr. McHutchin - - - -	Ootacamund - - - -	3	
Colonel Molesworth - - - -	- ditto - - - -	6	
Mr. C. Gray - - - -	Coonoor - - - -	12	
Mr. H. B. Liddell - - - -	Ootacamund - - - -	12	
TOTAL Number of Plants - - - -		31,622	

Ootacamund,
9 June 1864.

(signed) W. G. McIvor,
Superintendent Government Chinchona Plantations.

— No. 23. —

From Sir *Charles Wood* to The Government of Madras.

India Office, 8 August 1864.

Dated—
 11 Jan. 1864.
 23 Feb. "
 11 Mar. "
 13 April "
 19 May "
 14 June "

1. I HAVE considered in Council your letters in the Revenue Department, noted in the margin, reporting the progress of Chinchona cultivation on the Neilgherry Hills, and forwarding a box of Chinchona bark and leaves for analysis.

2. The exceptionally severe drought of the recent dry season has been a searching test of the suitability of the Neilgherry climate for the cultivation of Chinchona plants, and the way in which they have passed through this ordeal, while many coffee planters have sustained considerable losses, is very satisfactory. There can now be no doubt that the Chinchona plants have found on the Neilgherry hills a climate which is well adapted for their profitable cultivation.

3. Mr. Howard's report of his analysis of the third remittance of bark from India is encouraging, and establishes the fact that cultivation will improve the produce of febrifuge alkaloids in Chinchona plants. That eminent chemist recommends that the bark should be sent in its natural state for sale in the London market, and that no attempt should be made in India to reduce its bulk. But this suggestion, including the suggestion contained in your letter, dated August 12th (No. 80), 1863, calls for further very careful consideration, and will be discussed in a future Despatch.

4. I herewith transmit copies of the following papers for the use of Mr. McIvor and others who are interested in Chinchona cultivation :—

25 copies of Mr. Howard's Report of an analysis of the third remittance of bark from India ;

10 copies of the Reports for 1860 and 1861, respecting the condition of quinine cultivation in Java, by Dr. Junghuhn, translated from the Dutch, with some explanatory notes by Mr. Markham ; and

10 copies of a preliminary guide to the cultivation of quinine, by Dr. Junghuhn, translated from the Dutch.

— No. 24. —

From *W. G. McIvor*, Esq., Superintendent Government Chinchona Plantations, to the Secretary to Government, Fort St. George.

Sir,

Ootacamund, 17 March 1864.

1. I HAVE the honour to forward by banghy a box containing a further supply of Chinchona bark and leaves, as per list annexed, for transmission to the Right Honourable the Secretary of State for India, in order that they may be submitted to Mr. Howard for analysis and report.

2. The bark and leaves now forwarded were removed from the plants on the 24th of February last, being the dry season of the year, or the period when they are at rest, notwithstanding, the bark was found to separate freely from the stems ; therefore, if these specimens are found to contain a larger percentage of alkaloid than those previously submitted, this will, no doubt, be the most favourable season of the year for peeling and drying the bark.

3. Further observation seems to establish that the plants will give a fair yield of bark annually from lopping and pruning on the principle suggested in my letter of the 4th June 1861. In accordance with this system of pruning, I removed two of the lower branches from a plant of *Chinchona succirubra* two years and five months old. The bark of these branches form specimens Nos. 1 and 2, and give a total weight of 21½ tolas, or about 8½ ounces of dry bark. I expect that No. 1 will be valuable ; No. 2 is from the very small succulent branches, consequently its yield in alkaloid may not be of sufficient value to pay

the cost of preparation and transport. I am anxious that Mr. Howard should give the probable market value of these two samples of bark, in order to enable us to form an approximate estimate of the yearly returns from loppings and prunings, as I feel convinced that this will be our principal source of revenue, at least for many years to come, especially as the system tried experimentally of removing strips of bark from the stems of the plants has been found to injure their growth, and therefore cannot be profitably practised.

Chinchona succirubra.

No. 1. Bark from the thickest part of two lower branches of a plant of *C. succirubra* two years and five months old. This bark when fresh, *i. e.*, immediately after being removed from the branches, weighed 37 tolas;* one hour's drying reduced the weights to 32 tolas, and when perfectly dry it was found to have decreased in weight to 12½ tolas, giving a loss of about two-thirds in drying.

No. 2. Bark from the spray or small portions of the same branches as No. 1. This bark when fresh weighed 40 tolas or 1 lb., in one hour's drying its weight was reduced to 31 tolas, and when thoroughly dry to 9½ tolas, making the loss of weight in drying fully three-fourths.

No. 3. Bark from the stems of *C. succirubra* from plants of 16 months' growth, weighing 18½ tolas of dry bark.

No. 4. Bark from the small branches of the same plants as No. 3, weighing 12½ tolas of dry bark.

No. 5. Dry leaves of *C. succirubra*.

No. 6. Specimens of the wood of *C. succirubra* from which strips of bark had been previously removed, showing the injury done to the stem by this process.

(signed) *W. G. McIvor*,
Superintendent Government Chinchona Plantation.

From *W. G. McIvor*, Esq., Superintendent Government Chinchona Plantations, to *J. D. Sim*, Esq., Secretary to Government, Revenue Department, Fort St. George.

Sir,

Ootacamund, 19 March 1864.

IN continuation of my letter of the 17th instant, I have the honour to inform you that I have this day forwarded by banghy a portion of the bark belonging to sample No. 3, which unfortunately by an oversight was omitted to be packed; this makes the total weight of dry bark of No. 3 specimen 33 tolas, viz., 18½ tolas previously forwarded, and 14½ tolas now submitted; and will feel obliged by your having the goodness to correct the list accordingly,

— No. 25. —

REPORT of an Analysis of the Third Remittance† of Bark from India.

From *J. E. Howard*, Esq., to the Under Secretary of State for India.

Sir,

15 June 1864.

I HAVE the honour to report that I received, on the 20th May, the specimens mentioned by Mr. McIvor in his Despatch of 17th March last, and that the same were all in good condition.

I have

* Note.—40 tolas make 1 English pound, and consequently 2½ tolas = 1 ounce.

† The first remittance was received in the spring of 1863, and the second in October 1863.

I have since devoted most careful attention to ascertain by experiment the probable market value, especially of the first two samples of bark sent. It will not be necessary for me to detail the various means by which I succeeded in convincing myself, not only of the existence of the alkaloids, but of their being extant in such a state of purity as is certainly not found in the ordinary samples of red bark imported from South America. The result of my examination tended to show distinctly, that cultivation has improved the produce of at least this species of *Chinchona*.*

I must remark that the commercial value of specimens of bark intended for the manufacturers of sulphate of quinine can never be ascertained by the mere knowledge of the per centage of alkaloid soluble in ether, since it is necessary that this should be shown to exist in such a state as to crystallize with acids into the required compounds.

In the case of No. 1, the bark from the thickest part of the lower branches of a *C. succirubra*, two years and five months old, this examination was most satisfactory, confirming that which I stated in my first report as to the facility with which the alkaloids were obtained in a state of purity, although the amount of red colouring matter in the bark is very great. The amount of purified alkaloids I estimate at 6 per cent., consisting of quinine 3·14, chinchonidine 2·06,† chinchonine 0·80. This large product of alkaloids might probably be still further increased by surrounding the stem with moss, in the manner which Mr. Melvor has so happily suggested, since Dr. De Vry found 8·409 per cent. of alkaloids in a stem which had been so treated. It seems to me, from this trial, that the East Indian bark, the produce of *C. succirubra*, will rival in price the Bolivian *Calisaya*, which is by no means the case with the bark of the branches of the *C. succirubra* as grown in South America. It is important to remark, that the very high price of between 8 s. and 9 s., which has quite recently been paid for red bark in this market, applies only to those pieces of bark from the trunk of the tree which possess, from their age, a peculiar bright red appearance.‡ I have forwarded a small vial with commercial sulphate of quinine obtained from this No. 1, as also sulphate of chinchonidine separate from the above. I have only to remark further on this bark, that its appearance bespeaks its good quality, and that there can be no doubt the season chosen (24th of February) is most favourable to its being well secured.

Of No. 2 I cannot speak so favourably. This consists of the very minute bark from the spray or small portions of the same branches as No. 1. From this I did not succeed in obtaining more than 0·9 per cent. of impure alkaloid, which lost one-half in the attempt to purify, since the alkaloids are much implicated with tannin (apparently), and not capable of easy crystallization. I would suggest that the best destination for the bark of these small branches might probably be to sell it to the druggist for pharmaceutical preparations, for which purpose it is well adapted, as being quite equal to much that is brought from Peru for this purpose. I do not think that it could be considered worth any price for manufacturing purposes.

No. 3. Bark from plants of *C. succirubra* of 16 months' growth yielded me not quite 3 per cent. of alkaloid, which I estimate as follows:—quinine and chinchonidine 2·45, chinchonine 0·52; total 2·97 per cent.

The consideration of this specimen forcibly suggests the desirability of giving the bark as long a time as possible to mature, since the additional 13 months of No. 1 specimen have much more than doubled the commercial value of the bark, the proportion of quinine, which could be easily obtained crystallized as sulphate, being about one-third of No. 1 specimen.

No. 4 resembles No. 2. I may remark that I find the alkaloid (or alkaloids) in the leaves in a highly exceptional and, I suppose, transitional state, and one rapidly passing under the influence of the oxygen of the air into that of the quinioidine of commerce. The young shoots appear to contain the alkaloids in a more mature condition than the leaves, but still somewhat intermediate between these and the larger branches. The amount of alkaloid 1·10 per cent., of which soluble in ether 0·51. The remainder consisted of alkaloid precipitated by ammonia

* The same does not seem to hold good of the *C. Calisaya* in Java.

† Forming a resinous hydriodate.

‡ The bark of the branches of the same parcel did not produce 2·6.

monia in union apparently with oxydized tannin, which separated on solution of the alkaloid in spirits of wine. It is obvious that further research on larger quantities of bark and leaves is needed to elucidate the difficult and interesting problems which arise in connexion with the question how the alkaloids are built up in the plant itself.

I have been asked by Mr. Markham to give an opinion "whether, even if the difficulties in the way of carrying on delicate chemical processes might prevent success in obtaining pure commercial quinine in India, yet still a rough substance might not be produced which would be efficacious as a febrifuge, and which might also be imported into Europe for the manufacture of quinine, instead of sending home many times the bulk and weight of bark." My reply is, that experience has hitherto shown, by the failure of the very numerous attempts in this direction, that the collectors and importers reap in the end more profit from sending in to the European market the raw material than the half manufactured product. This latter would command no price worth mentioning as a febrifuge *per se*. It would simply come into competition with the quinoidine and refuse product of the bark operation. As to the reasons why it is not profitable to bring the product into a smaller bulk for facility of transport, they depend in part on the complexity of the organic constituents of the barks, leading (especially under the influence of lime or alkalis) to deteriorating changes in the alkaloids, and partly also to the tendency of the heat to which the product must be subjected operating in the same direction. If I had a bark plantation in India, I should unquestionably order the bark sent home, even if I had skilful and experienced workmen to whom the task could be safely confided in India of attempting to reduce the cost of transport.

I have, &c.

(signed) *John Eliot Howard.*

— No. 26. —

From Mr. *Merivale* to Mr. *Howard*.

Sir,

India Office, 18 August 1864.

I AM desired by Sir Charles Wood to acknowledge the receipt of your report of an analysis of the third remittance of Chinchona bark, from the Neilgherry Hills, copies of which have been forwarded to the Governments of India and Madras.

Sir Charles Wood wishes me to express to you his sense of the great value of the chemical investigations which you have undertaken at his request, on this and other occasions; and to thank you for the careful attention you have bestowed on the analysis of the Chinchona bark, which has been, from time to time, placed in your hands.

The last analysis appears to have been particularly satisfactory, and to have shown distinctly that cultivation in India has improved the produce of the Chinchona plants.

I am, &c.

(signed) *Herman Merivale.*

— No. 27. —

From the Government of Madras to the Secretary of State for India.

Madras, 23 July 1864.

WE have the honour to forward for your information the accompanying Tabular Report on the number, condition, &c., of the Chinchona plants on the Neilgherries, on the 30th June 1864.

Enclosure in No. 27.

REPORT on the Number, Distribution, and Condition of Chinchona Plants on the Neilgherries, on the
30th June 1864.

No. of Species.	Botanical Names.	Commercial Names.	Number of Plants.	Value per Lb. of Dry Bark in the London Market.	REMARKS.
				s. d. s. d.	
1	<i>C. succirubra</i> - -	Red Bark - -	107,262	2 6 to 8 9	The number of plants planted out on the plantations during the month is 15,350, making the total 159,666 plants permanently planted out.
2	<i>C. Calisaya</i> - -	Yellow Bark - -	2,294	2 10 to 7 -	
3	<i>C. officinalis</i> , var. <i>Condaminea</i> (<i>C. Uritusinga</i>).	Original Loxa Bark -	4,222	2 10 to 7 -	
4	<i>C. officinalis</i> , var. <i>Bonplandiana</i> (<i>C. Chahuarguera</i>).	Select Crown Bark -	257,204	2 10 to 7 -	The increase by propagation is 31,984, being 9,328 plants above the average of the last six months, making the total number of plants at the end of the month 400,214.
5	<i>C. crespilla</i> - -	Fine Grey Bark - -	1,982	2 10 to 6 -	
6	<i>C. lancifolia</i> - -	Pitayo Bark - -	18	1 8 to 2 10	
7	<i>C. nitida</i> - -	Genuine Grey Bark -	8,477	1 8 to 2 9	Worthless.
8	<i>C. Species</i> without name.	Fine Bark - -	2,780	1 8 to 2 10	
9	<i>C. micrantha</i> - -	Grey Bark - -	12,307	1 8 to 2 9	
10	<i>C. Peruviana</i> - -	Finest Grey Bark -	3,243	1 8 to 2 10	
11	<i>C. Pahudiana</i> - -	Unknown - -	425		
* TOTAL Number of Plants - - -			400,214		

TABLE II.

MEMORANDUM of the Growth of Eleven Plants of *C. succirubra*, planted on the Second Denison Plantation, at Neddivuttum, on 30 August 1862.

Number of Plants.	Height in Inches when Planted on the 30th August 1862.	Height in Inches on the 31st May 1864.	Height in Inches on the 30th June 1864.	Growth in Inches during June 1864.	By whom Planted.
1	23	98	99	1	His Excellency Sir W. Denison.
2	16½	90	91	1	
3	19	87	90	3	
4	15	91½	93	1½	J. W. Breeks, Esq.
5	27	106	107	1	
6	20	78	80½	2½	
7	20	96	97½	1½	Dr. Sanderson.
8	18	93	96½	3½	
9	20	94	97	3	
10	20	101	103½	2½	Lieutenant McLeod.
11	18	89	92½	3½	
12	-	35	37	2	

TABLE II. exhibits the growth of eleven plants of *Chinchona succirubra* planted out by his Excellency the Governor, and other gentlemen, at Neddivuttum, on the 30th August 1862. The average growth of these plants during the month is $2\frac{2}{3}$ inches, or $\frac{2}{3}$ of an inch above the average growth of last month.

One of the two plants cut down on the 20th of March 1863 for the bark submitted to Mr. Howard for analysis, has made strong shoots of 37 inches in height, giving the growth of 2 inches during the month, or $1\frac{1}{2}$ inches under the growth of last month.

J. D. Sim, Esq.
P. Grant, Esq.
Plant cut down for bark.

TABLE III.

SHOWING the Height of Twelve Plants of *C. officinalis*, planted on the Dodabetta Plantation at Ootacamund, on the 30th September 1863.

Number of Plants.	Height in Inches when Planted on the 30th September 1863.	Height in Inches on the 31st May 1864.	Height in Inches on the 30th June 1864.	Growth in Inches during June 1864.	REMARKS.
1	19	44	49	5	The twelve plants of <i>Chinchona officinalis</i> (a shrubby species) on the Dodabetta Plantation give an average growth of $4\frac{1}{4}$ inches, or $\frac{2}{3}$ of an inch above the growth of last month.
2	14 $\frac{1}{2}$	37 $\frac{1}{2}$	41 $\frac{1}{2}$	4	
3	28	54	55	1 $\frac{1}{2}$	
4	22	49	54 $\frac{1}{2}$	5 $\frac{1}{2}$	
5	21 $\frac{1}{2}$	44	49	5	
6	28	54	58	4	
7	22 $\frac{1}{2}$	46 $\frac{1}{2}$	50	3 $\frac{1}{2}$	
8	21 $\frac{1}{2}$	48 $\frac{1}{2}$	51 $\frac{1}{2}$	3	
9	21 $\frac{1}{2}$	52 $\frac{1}{2}$	58	5 $\frac{1}{2}$	
10	19 $\frac{1}{2}$	50	53	3	
11	24	50	53 $\frac{1}{2}$	3 $\frac{1}{2}$	
12	24	47 $\frac{1}{2}$	52 $\frac{1}{2}$	5	

TABLE IV.

REGISTER of Chinchona Plants Distributed.

The number of plants issued to the public is 2,015, making the total number of plants distributed 33,677.

NAMES.	STATION.	Number of Plants.
Mr. F. N. Maltby - - - -	Travancore - - -	16
Dr. Junghun - - - -	Java - - -	56
Mr. A. R. Lascelles - - - -	Ootacamund - - -	12
Mr. M. Anderson - - - -	Jamaica - - -	2
Dr. Wiehe - - - -	Bombay - - -	10
Dr. T. Anderson - - - -	Calcutta - - -	554
Dr. Jamieson - - - -	Saharanpore - - -	107
Professor Lees - - - -	Calcutta - - -	547
Rajah of Travancore - - - -	Travancore - - -	521
Major Morgan - - - -	Ootacamund - - -	1,534
Mr. E. T. Fitzgerald - - - -	Calcutta - - -	405
Mr. J. W. Money - - - -	- ditto - - -	581
Dr. W. Bourne - - - -	- ditto - - -	532
Captain Cox - - - -	Wainad - - -	6
Mr. Hallock - - - -	- ditto - - -	2
Mr. T. Sheffield - - - -	Ootacamund - - -	12
Dr. F. Day - - - -	Cochin - - -	100
Mr. Brown - - - -	Tellicherry - - -	12
„ J. Hall - - - -	Ootacamund - - -	144
„ J. Knop - - - -	- ditto - - -	18
Captain Lees - - - -	Bengal - - -	281
Mr. W. H. Rayne - - - -	Manantoddy - - -	24
Rev. — Sawyer - - - -	Ootacamund - - -	1,018
Mr. Friend - - - -	- ditto - - -	12
„ Hallock - - - -	- ditto - - -	1
„ J. Perie - - - -	Seegoor - - -	12
Colonel Scott - - - -	Ootacamund - - -	1,024
Mr. F. Berend - - - -	Cachar - - -	275
Rev. J. Hunter - - - -	Coonoor - - -	12
Mr. J. Mullaly - - - -	- ditto - - -	24

TABLE IV.—Register of Chinchona Plants Distributed—*continued*.

NAMES.	STATION.	Number of Plants.	REMARKS.
Mr. W. H. Stanes - - - -	Coonoor - - - -	12	
Colonel R. Cooper - - - -	Kotagherry - - - -	12	
Mr. F. Cockburn - - - -	- ditto - - - -	12	
Colonel Woodfall - - - -	Coonoor - - - -	12	
Mr. C. Anderson - - - -	- ditto - - - -	24	
Colonel Angelo - - - -	Ootacamund - - - -	12	
Rev. E. Laseon - - - -	- ditto - - - -	12	
Captain R. N. Taylor - - - -	Coorg - - - -	96	
Major W. Agnew - - - -	Assam - - - -	139	
Mr. V. H. Levinge - - - -	Madura - - - -	12	
Chief Commissioner - - - -	Nagpore - - - -	28	
Mr. Fletcher - - - -	Ootacamund - - - -	24	
Gool Mahomed - - - -	- ditto - - - -	20	
General McCleverty - - - -	New Zealand - - - -	23	
Mr. W. Robinson - - - -	Kotagherry - - - -	18	
„ Crake - - - -	Wainad - - - -	12	
„ H. R. Dawson - - - -	Seegoor - - - -	12	
Captain Manu - - - -	Coorg - - - -	48	
Mr. E. Roberts - - - -	Ootacamund - - - -	6	
„ H. Russell - - - -	Wainad - - - -	12	
Rev. -- Wait - - - -	Coonoor - - - -	2	
Mr. H. de Facien - - - -	Katary - - - -	5,189	
Collector of Belgaum - - - -	Belgaum - - - -	28	
„ „ Honore - - - -	Honore - - - -	28	
Dr. Ross - - - -	- ditto - - - -	15	
His Excellency the Governor of Bombay.	Bombay - - - -	158	
Mr. H. Hinde - - - -	Wainad - - - -	12	
„ E. B. Thomas - - - -	Coonoor - - - -	12	
Rajah of Poonganoor - - - -	Poonganoor - - - -	12	
Major Grant - - - -	Wellington - - - -	113	
Messrs. Thomson, Shaw & Co. - - - -	Poonganoor - - - -	28	
Mr. J. H. Trinson - - - -	- ditto - - - -	31	
Dr. Muller - - - -	Melbourne - - - -	28	
Mr. Tyrrell - - - -	Mysore - - - -	12	
Dr. Sayers - - - -	Vellore - - - -	12	
Major C. P. Taylor - - - -	Ootacamund - - - -	3,181	
Doctor Wilson - - - -	- ditto - - - -	6	
Mr. Schnarie - - - -	- ditto - - - -	15,000	
Captain Fuller - - - -	Coonoor - - - -	147	
Mr. Drummond - - - -	Ootacamund - - - -	224	
Captain Jennings - - - -	- ditto - - - -	200	
Lieut. H. B. Montmorency - - - -	Bangalore - - - -	6	
Mr. McHutchin - - - -	Ootacamund - - - -	3	
Colonel Molesworth - - - -	- ditto - - - -	6	
Mr. C. Gray - - - -	Coonoor - - - -	12	
„ H. B. Liddell - - - -	Ootacamund - - - -	12	
„ Minchin - - - -	Wynad - - - -	800	
TOTAL Number of Plants - - -		33,677	

Ootacamund,
13 July 1864.

(signed) *W. G. McIvor*,
Superintendent Government Chinchona Plantations.

— No. 28. —

From the Government of Madras to the Secretary of State for India.

Madras, 25 August 1864.

WE have the honour to forward for your information the accompanying Tabular Report on the number, condition, &c., of the Chinchona plants on the Neilgherries on the 31st July 1864.

Enclosure in No. 28.

REPORT on the Number, Distribution, and Condition of Chinchona Plants on the Neilgherries, on the 31st July 1864.

No. of Species.	Botanical Names.	Commercial Names.	Number of Plants.	Value per Lb. of Dry Bark in the London Market.	REMARKS.
				<i>s. d.</i> <i>s. d.</i>	
1	<i>C. succirubra</i> - -	Red Bark - -	115,400	2 6 to 8 9	The month being very wet and stormy, caused several land slips on the Neddivuttum Plantations, destroying 2,100 transplanted plants. The number of plants planted out during the month is 3,985, from which, deducting the loss of 2,100, makes the total number 161,551 plants permanently planted out.
2	<i>C. Calisaya</i> - -	Yellow Bark - -	2,369	2 10 to 7 -	
3	<i>C. officinalis</i> , var. <i>Condaminia</i> (<i>C. Uritus</i>).	Original Loxa Bark -	1,661	2 10 to 7 -	
4	<i>C. officinalis</i> , var. <i>Bonplandiana</i> (<i>C. Chahuarguera</i>).	Select Crown Bark -	262,964	2 10 to 7 -	
5	<i>C. crespilla</i> - -	Fine Grey Bark -	2,103	2 10 to 6 -	The increase by propagation is 17,486, being 7,393 plants under the average of the last six months, making the total number of plants at the end of the month 412,343.
6	<i>C. lancifolia</i> - -	Pitayo Bark - -	18	1 8 to 2 10	
7	<i>C. nitida</i> - -	Genuine Grey Bark -	8,481	1 8 to 2 9	
8	<i>C. Species</i> without name.	Fine Bark - -	2,780	1 8 to 2 10	
9	<i>C. micrantha</i> - -	Grey Bark - -	12,839	1 8 to 2 9	
10	<i>C. Peruviana</i> - -	Finest Grey Bark -	3,303	1 8 to 2 10	
11	<i>C. Pahudiana</i> - -	Unknown - -	425	Worthless.	
TOTAL Number of Plants - - -			412,343		

TABLE II.

MEMORANDUM of the Growth of Eleven Plants of *C. succirubra*, planted on the Second Denison Plantation, at Neddivuttum, on 30 August 1862.

Number of Plants.	Height in Inches when Planted on 30 August 1862.	Height in Inches on 30 June 1864.	Height in Inches on 31 July 1864.	Growth in Inches during July 1864.	By whom Planted.
1	23	99	100½	1½	His Excellency Sir W. Denison.
2	16½	91	93	2	
3	19	90	92	2	
4	15	93	93½	½	
5	27	107	108	1	
6	20	80½	82	1½	J. W. Brecks, Esq. Dr. Sanderson. J. D. Sim, Esq. Lieutenant McLeod. P. Grant, Esq. Plant cut down for bark.
7	20	97½	100	2½	
8	18	96½	98	1½	
9	20	97	98½	1½	
10	20	103½	103½	½	
11	18	92½	93½	1	
12	-	37	39½	2½	

TABLE II. exhibits the growth of 11 plants of *Chinchona succirubra* planted out by his Excellency the Governor and other gentlemen at Neddivuttum on the 30th August 1862. The average growth of these plants during the month is 1¼ inches or ¼ of an inch under the growth of last month.

One of the two plants cut down on the 20th of March 1863 for the bark, submitted to Mr. Howard for analysis, has made strong shoots of 39½ inches in height, giving the growth of 2½ inches during the month, or ½ an inch above the growth of last month.

TABLE III.

SHOWING the Height of Twelve Plants of *C. officinalis*, planted on the Dodabetta Plantation at Ootacamund, on the 30th September 1863.

Number of Plants.	Height in Inches when Planted on the 30th September 1863.	Height in Inches on the 30th June 1864.	Height in Inches on the 31st July 1864.	Growth in Inches during July 1864.	REMARKS.
1	19	49	52	3½	The 12 plants of <i>Chinchona officinalis</i> (a shrubby species) on the Dodabetta Plantation, give an average growth of 3 inches, or 1½ inches under the growth of last month.
2	14½	41½	54	2½	
3	28	55	58	3	
4	22	54½	56	1½	
5	21½	49	52	3	
6	28	58	59	1	
7	22½	50	59	4	
8	21½	51½	56	4½	
9	21½	58	62	4	
10	19½	53	56	3	
11	24	53½	55	1½	
12	24	52	57	4½	

TABLE IV.

REGISTER of Chinchona Plants Distributed.

NAMES.	STATIONS.	Number of Plants.
Mr. F. N. Maltby - - -	Travancore - - -	16
Dr. Junghun - - -	Java - - -	56
Mr. A. R. Lascelles - - -	Ootacamund - - -	12
Mr. M. Anderson - - -	Jamaica - - -	2
Dr. Wiehe - - -	Bombay - - -	10
Dr. T. Anderson - - -	Calcutta - - -	554
Dr. Jamieson - - -	Saharanpore - - -	107
Professor Lees - - -	Calcutta - - -	547
Rajah of - - -	Travancore - - -	521
Major Morgan - - -	Ootacamund - - -	1,534
Mr. E. T. Fitzgerald - - -	Calcutta - - -	405
Mr. J. W. Money - - -	- ditto - - -	581
Dr. W. Bourne - - -	- ditto - - -	532
Captain Cox - - -	Wainad - - -	6
Mr. Hallock - - -	- ditto - - -	2
Mr. T. Sheffield - - -	Ootacamund - - -	12
Dr. F. Day - - -	Cochin - - -	100
Mr. Brown - - -	Tellicherry - - -	12
Mr. J. Hall - - -	Ootacamund - - -	144
Mr. J. Knop - - -	- ditto - - -	18
Captain Lees - - -	Bengal - - -	281
Mr. W. H. Rayne - - -	Manantoddy - - -	24
Rev. — Sawyer - - -	Ootacamund - - -	1,018
Mr. Friend - - -	- ditto - - -	12
Mr. Hallock - - -	- ditto - - -	1
Mr. J. Perie - - -	Seegoor - - -	12
Colonel Scott - - -	Ootacamund - - -	1,024
Mr. F. Berend - - -	Cachar - - -	275
Rev. J. Hunter - - -	Coonoor - - -	12
Mr. J. Mullaly - - -	- ditto - - -	24
Mr. W. H. Stanes - - -	- ditto - - -	12
Colonel R. Cooper - - -	Kotagherry - - -	12
Mr. F. Cockburn - - -	- ditto - - -	12
Colonel Woodfall - - -	Coonoor - - -	12
Mr. C. Anderson - - -	- ditto - - -	24
Colonel Angelo - - -	Ootacamund - - -	12
Rev. E. Laseon - - -	- ditto - - -	12
Captain R. N. Taylor - - -	Coorg - - -	96
Major W. Agnew - - -	Assam - - -	139
Mr. V. H. Levinge - - -	Madura - - -	12
Chief Commissioner - - -	Nagpore - - -	28
Mr. Fletcher - - -	Ootacamund - - -	24
Gool Mahomed - - -	- ditto - - -	20

The number of plants issued to the public is 5,357, making the total number of plants distributed 39,034.

TABLE IV.—Register of Chinchona Plants Distributed, &c.—*continued*.

NAMES.	STATIONS.	Number of Plants.	REMARKS.
General McCleverty - - -	New Zealand - -	23	
Mr. W. Robinson - - -	Kotagherry - -	18	
Mr. Crake - - -	Wynad - - -	12	
Mr. H. R. Dawson - - -	Seegoor - - -	12	
Captain Mann - - -	Coorg - - -	48	
Mr. E. Roberts - - -	Ootacamund - -	6	
Mr. H. Russell - - -	Wynad - - -	12	
Reverend — Wait - - -	Coonoor - - -	2	
Mr. H. de Facien - - -	Katary - - -	5,189	
Collector of Belgaum - - -	Belgaum - - -	28	
Collector of Honore - - -	Honore - - -	28	
Dr. Ross - - -	- ditto - - -	15	
His Excellency the Governor -	Bombay - - -	158	
Mr. H. Hinde - - -	Wynad - - -	12	
Mr. E. B. Thomas - - -	Coonoor - - -	12	
Rajah of Poonganoor - - -	Poonganoor - -	12	
Major Grant - - -	Wellington - -	226	
Messrs. Thomson, Shaw & Co. -	Poonganoor - -	28	
Mr. J. H. Trinson - - -	- ditto - - -	31	
Dr. Muller - - -	Melbourne - -	28	
Mr. Tyrrell - - -	Mysore - - -	12	
Dr. Sayers - - -	Vellore - - -	12	
Major C. P. Taylor - - -	Ootacamund - -	5,250	
Doctor Wilson - - -	- ditto - - -	6	
Mr. Schnarie - - -	- ditto - - -	15,000	
Captain Fuller - - -	Coonoor - - -	266	
Mr. Drummond - - -	Ootacamund - -	224	
Captain Jennings - - -	- ditto - - -	730	
Lieutenant H. B. Montmorency -	Bangalore - -	6	
Mr. McHutchin - - -	Ootacamund - -	3	
Colonel Molesworth - - -	- ditto - - -	6	
Mr. C. Gray - - -	Coonoor - - -	12	
Mr. H. B. Liddell - - -	Ootacamund - -	12	
Mr. Minchin - - -	Wynad - - -	1,600	
His Excellency the Governor -	Vizagapatam - -	35	
Mr. R. F. Phillips - - -	Kotagherry - -	667	
Colonel Cooke - - -	- ditto - - -	24	
Mr. G. J. Glasson - - -	Wynad - - -	1,000	
TOTAL Number of Plants - -		39,034	

Ootacamund,
15 August 1864.

(signed) *W. G. McIvor*,
Superintendent Government Chinchona Plantations.

— No. 29. —

From the Government of Madras to the Secretary of State for India.

Madras, 13 September 1864.

WE have the honour to forward for your information the accompanying Tabular Report on the number, condition, &c., of the Chinchona plants on the Neilgherries on the 31st August 1864.

Enclosure in No. 29.

REPORT on the Number, Distribution, and Condition of Chinchona Plants on the Neilgherries, on the 31st August 1864.

No. of Species.	Botanical Names.	Commercial Names.	Number of Plants.	Value per Lb. of Dry Bark in the London Market.	REMARKS.
				<i>s. d.</i> <i>s. d.</i>	
1	<i>C. succirubra</i> - -	Red Bark - -	114,053	2 6 to 8 9	The number of plants planted out on the plantations during the month is 12,000, making the total 173,551 plants permanently planted out.
2	<i>C. Calisaya</i> - -	Yellow Bark - -	2,392	2 10 to 7 -	
3	<i>C. officinalis</i> , var. <i>Condaminea</i> (<i>C. Uritusinga</i>).	Original Loxa Bark -	587	2 10 to 7 -	
4	<i>C. officinalis</i> , var. <i>Bonplandiana</i> (<i>C. Chahuarguera</i>).	Select Crown Bark -	277,682	2 10 to 7 -	The increase by propagation is 18,420, being 6,687 plants under the average of the last six months, making the total number of plants at the end of the month 424,899.
5	<i>C. crespilla</i> - -	Fine Grey Bark - -	2,062	2 10 to 6 -	
6	<i>C. lancifolia</i> - -	Pitayo Bark - -	20	1 8 to 2 10	
7	<i>C. nitida</i> - -	Genuine Grey Bark -	8,483	1 8 to 2 9	
8	<i>C. species</i> without name.	Fine Bark - -	2,780	1 8 to 2 10	
9	<i>C. micrantha</i> - -	Grey Bark - -	13,084	1 8 to 2 9	
10	<i>C. Peruviana</i> - -	Finest Grey Bark -	3,331	1 8 to 2 10	
11	<i>C. Pahudiana</i> - -	Unknown - -	425	Worthless.	
TOTAL Number of Plants - - -			424,899		

TABLE II.

MEMORANDUM of the Growth of Eleven Plants of *C. succirubra*, planted on the Second Denison Plantation, at Neddivuttum, on 30 August 1862.

Number of Plants.	Height in Inches when Planted on 30 August 1862.	Height in Inches on 31 July 1864.	Height in Inches on 31 August 1864.	Growth in Inches during August 1864.	By whom Planted.
1	23	100½	103	2½	His Excellency Sir W. Denison.
2	16½	93	94½	1½	
3	19	92	94	2	
4	15	93½	95	1½	
5	27	108	112	4	J. W. Brecks, Esq. Dr. Sanderson. J. D. Sim, Esq. Lieutenant McLeod. P. Grant, Esq. Plant cut down for bark.
6	20	82	83½	1½	
7	20	100	101	1	
8	18	98	98½	0½	
9	20	98½	99	0½	
10	20	103½	105	1½	
11	18	93½	95	1½	
12	-	39½	45	5½	

TABLE II. exhibits the growth of 11 plants of *Chinchona succirubra*, planted out by His Excellency the Governor, and other gentlemen at Neddivuttum, on the 30th August 1862. The average growth of these plants during the month is $1\frac{1}{4}$ inches, or $\frac{3}{4}$ of an inch above the growth of last month.

One of the two plants cut down on the 20th of March 1863 for the bark submitted to Mr. Howard for analysis, has made strong shoots of 45 inches in height, giving the growth of $5\frac{1}{2}$ inches during the month, or 2 inches above the growth of last month.

TABLE III.

SHOWING the Height of Twelve Plants of *C. officinalis* planted on the Dodabetta Plantation at Ootacamund, on the 30th September 1863.

Number of Plants.	Height in Inches when Planted on 30 September 1863.	Height in Inches on 31 July 1864.	Height in Inches on 31 August 1864.	Height in Inches during August 1864.	REMARKS.
1	19	52 $\frac{1}{2}$	56	3 $\frac{1}{2}$	The 12 plants of <i>Chinchona officinalis</i> (a shrubby species) on the Dodabetta Plantation, gives an average growth of 3 $\frac{1}{2}$ inches, or $\frac{1}{2}$ of an inch above the growth of last month.
2	14 $\frac{1}{2}$	44	47 $\frac{1}{2}$	3 $\frac{1}{2}$	
3	28	58	60 $\frac{1}{2}$	2 $\frac{1}{2}$	
4	22	56	60	4	
5	21 $\frac{1}{2}$	52	56 $\frac{1}{2}$	4 $\frac{1}{2}$	
6	28	59	63	4	
7	22 $\frac{1}{2}$	54	56	2	
8	21 $\frac{1}{2}$	56	58	2	
9	21 $\frac{1}{2}$	62	66 $\frac{1}{2}$	4 $\frac{1}{2}$	
10	19 $\frac{1}{2}$	56	59	3	
11	24	55	59	4	
12	24	57	61	4	

TABLE IV.

REGISTER of Plants Distributed.

NAMES.	STATION.	Number of Plants.
Mr. F. N. Maltby - - - -	Travancore - - -	16
Dr. Junghuhn - - - -	Java - - -	56
Mr. A. R. Lascelles - - -	Ootacamund - - -	12
„ M. Anderson - - - -	Jamaica - - -	2
Dr. Wiehe - - - -	Bombay - - -	10
„ T. Anderson - - - -	Calcutta - - -	554
„ Jamieson - - - -	Saharanpore - - -	107
Professor Lees - - - -	Calcutta - - -	547
Rajah of Travancore - - -	Travancore - - -	521
Major Morgan - - - -	Ootacamund - - -	1,534
Mr. E. T. Fitzgerald - - -	Calcutta - - -	405
„ J. W. B. Money - - - -	- ditto - - -	1,369
Dr. W. Bourne - - - -	- ditto - - -	532
Captain Cox - - - -	Wynad - - -	6
Mr. Hallock - - - -	- ditto - - -	2
„ T. Sheffield - - - -	Ootacamund - - -	12
Dr. F. Day - - - -	Cochin - - -	100
Mr. Brown - - - -	Tellicherry - - -	12
„ J. Hall - - - -	Ootacamund - - -	144
„ J. Knop - - - -	- ditto - - -	18
Captain Lees - - - -	Bengal - - -	281
Mr. W. H. Rayne - - - -	Manantoddy - - -	24
Rev. Sawyer - - - -	Ootacamund - - -	1,018
Mr. A. Frend - - - -	- ditto - - -	112
„ Hallock - - - -	- ditto - - -	1
Mr. J. Perie - - - -	Seegoor - - -	12
Colonel Scott - - - -	Ootacamund - - -	1,024
Mr. F. Berend - - - -	Cachar - - -	275
Rev. J. Hunter - - - -	Coonoor - - -	12
Mr. J. Mullaly - - - -	- ditto - - -	24
„ W. H. Stanes - - - -	- ditto - - -	12
Colonel R. Cooper - - - -	Kotagherry - - -	12
Mr. F. Cockburn - - - -	- ditto - - -	12
Colonel Woodfall - - - -	Coonoor - - -	12
Mr. C. Anderson - - - -	- ditto - - -	24
Colonel Angelo - - - -	Ootacamund - - -	12
Rev. E. Laseron - - - -	- ditto - - -	12
Captain R. N. Taylor - - -	Coorg - - -	96

The number of plants issued to the public is 5,864, making the total number of plants distributed 44,898.

TABLE IV.—Register of Plants distributed—*continued*.

NAMES.	STATION.	Number of Plants.	REMARKS.
Major W. Agnew - - -	Assam - - -	139	
Mr. V. H. Levinge - - -	Madura - - -	12	
Chief Commissioner - - -	Nagpore - - -	28	
Mr. Fletcher - - -	Ootacamund - - -	24	
Gool Mahomed - - -	- ditto - - -	20	
General McCleverty - - -	New Zealand - - -	23	
Mr. W. Robinson - - -	Kotagherry - - -	18	
" Crake - - -	Wynad - - -	12	
" H. R. Dawson - - -	Seegoor - - -	12	
Captain Mann - - -	Coorg - - -	48	
Mr. E. Roberts - - -	Ootacamund - - -	6	
" H. Russell - - -	Wynad - - -	12	
Rev. — Wait - - -	Coonoor - - -	2	
Mr. H. de Facien - - -	Katary - - -	5,189	
Collector of Belgaum - - -	Belgaum - - -	28	
" Honore - - -	Honore - - -	28	
Dr. Ross - - -	- ditto - - -	15	
His Excellency the Governor - - -	Bombay - - -	158	
Mr. H. Hinde - - -	Wynad - - -	12	
" E. B. Thomas - - -	Coonoor - - -	12	
Rajah of Poonganoor - - -	Poonganoor - - -	12	
Major Grant - - -	Wellington - - -	226	
Messrs. Thomson, Shaw & Co. - - -	Poonganoor - - -	28	
Mr. J. H. Trinson - - -	- ditto - - -	31	
Dr. Muller - - -	Melbourne - - -	28	
Mr. Tyrrell - - -	Mysore - - -	12	
Dr. Sayers - - -	Vellore - - -	12	
Major C. P. Taylor - - -	Ootacamund - - -	5,250	
Doctor Wilson - - -	- ditto - - -	6	
Mr. Schnarie - - -	- ditto - - -	15,000	
Captain Fuller - - -	Coonoor - - -	266	
Mr. Drummond - - -	Ootacamund - - -	224	
Captain Jennings - - -	- ditto - - -	1,756	
Lient. H. B. Montmorency - - -	Bangalore - - -	6	
Mr. McHutchin - - -	Ootacamund - - -	3	
Colonel Molesworth - - -	- ditto - - -	6	
Mr. C. Gray - - -	Coonoor - - -	12	
" H. B. Liddell - - -	Ootacamund - - -	12	
" Minchin - - -	Wynad - - -	1,600	
His Excellency the Governor - - -	Vizagapatam - - -	35	
Mr. R. F. Phillips - - -	Kotagherry - - -	1,117	
Colonel Cooke - - -	- ditto - - -	24	
Mr. G. J. Glasson - - -	Wynad - - -	1,000	
Dr. Macpherson - - -	Mercara - - -	400	
Mr. W. H. Kerr - - -	Coorg - - -	3,100	
TOTAL Number of Plants - - -		44,898	

(signed) *W. G. McIvor*,
Superintendent Government Chinchona Plantations.

Ootacamund.
9 September 1864.

— No. 30. —

From the Government of Madras to the Secretary of State for India.

Madras, 19 October 1864.

WE have the honour to forward, for your information, the accompanying Tabular Report on the number, condition, &c., of the Chinchona plants on the Neilgherries, on the 30th September 1864.

Enclosure in No. 30.

REPORT on the Number, Distribution, and Condition of Chinchona Plants on the Neilgherries, on the 30th September 1864.

N ^o . of Species.	Botanical Names.	Commercial Names.	Number of Plants.	Value per Lb. of Dry Bark in the London Market.		REMARKS.
				<i>s.</i>	<i>d.</i>	
1	<i>C. succirubra</i> - -	Red Bark - -	119,135	2 6	to 8 9	The planting season having passed, the number of plants planted out in the plantations remain the same as in the last month viz., 173,551.
2	<i>C. Calisaya</i> - -	Yellow Bark - -	2,481	2 10	to 7 -	
3	<i>C. officinalis</i> , var. <i>Condaminea</i> (<i>C. Uritusinga</i>).	Original Loxa Bark	1,529	2 10	to 7 -	
4	<i>C. officinalis</i> , var. <i>Bonplandiana</i> (<i>C. Chahuarguera</i>).	Select Crown Bark -	291,085	2 10	to 7 -	The increase by propagation is 21,600, being 1,176 plants under the average of the last six months making the total number of plants at the end of the month 445,291.
5	<i>C. crespilla</i> - -	Fine Grey Bark -	2,230	2 10	to 6 -	
6	<i>C. lancifolia</i> - -	Pitayo Bark - -	20	1 8	to 2 10	
7	<i>C. nitida</i> - -	Genuine Grey Bark	8,483	1 8	to 2 9	
8	<i>C. species</i> without name.	Fine Bark - -	2,780	1 8	to 2 10	
9	<i>C. micrantha</i> - -	Grey Bark - -	13,787	1 8	to 2 9	
10	<i>C. Peruviana</i> - -	Finest Grey Bark -	3,336	1 8	to 2 10	
11	<i>C. Pahudiana</i> - -	Unknown - -	425	Worthless.		
TOTAL Number of Plants - - -			445,291			

TABLE II.

MEMORANDUM of the Growth of Eleven Plants of *C. succirubra*, planted on the Second Denison Plantation, at Neddivuttum, on 30 August 1862.

Number of Plants.	Height in Inches when Planted on 30 August 1862.	Height in Inches on 31 August 1864.	Height in Inches on 30 September 1864.	Growth in Inches during September 1864.	By whom Planted.
1	23	103	105	2	His Excellency Sir W. Denison.
2	16½	94½	96	1½	
3	19	94	96	2	
4	15	95	96½	1½	
5	27	112	113½	1½	
6	20	83½	85	1½	
7	20	101	104½	3½	J. W. Breeks, Esq.
8	18	98½	100½	2	Dr. Sanderson.
9	20	99	103	4	J. D. Sim, Esq.
10	20	105	106½	1½	Lieutenant McLeod.
11	18	95	95½	½	P. Grant, Esq.
12	-	45	48	3	Plant cut down for bark.

TABLE II. exhibits the growth of 11 plants of *Chinchona succirubra* planted out by his Excellency the Governor, and other gentlemen, at Neddivuttum, on the 30th August 1862. The average growth of these plants during the month is 2 inches being $\frac{1}{11}$ of an inch above the growth of last month.

One of the two plants cut down on the 20th of March 1863, for the bark submitted to Mr. Howard for analysis, has made strong shoot of 48 inches in height, giving the growth of 3 inches during the month.

TABLE III.

SHOWING the Height of Twelve Plants of *C. officinalis*, planted on the Dodabetta Plantation at Ootacamund, on the 30th September 1863.

Number of Plants.	Height in Inches when Planted on 30 September 1863.	Height in Inches on 31 August 1864.	Height in Inches on 30 September 1864.	Growth in Inches during September 1864.	REMARKS.
1	19	56	59	3	The twelve plants of <i>Chinchona officinalis</i> (a shrubby species) on the Dodabetta Plantation gives an average growth of three inches, or $\frac{1}{2}\frac{1}{4}$ of an inch, under the growth of last month.
2	14 $\frac{1}{2}$	47 $\frac{1}{2}$	50	2 $\frac{1}{2}$	
3	28	60 $\frac{1}{2}$	64	3 $\frac{1}{2}$	
4	22	60	63 $\frac{1}{2}$	3 $\frac{1}{2}$	
5	21 $\frac{1}{2}$	56 $\frac{1}{2}$	60	3 $\frac{1}{2}$	
6	28	63	66 $\frac{1}{2}$	3 $\frac{1}{2}$	
7	22 $\frac{1}{2}$	56	59	3	
8	21 $\frac{1}{2}$	58	60 $\frac{1}{2}$	2 $\frac{1}{2}$	
9	21 $\frac{1}{2}$	66 $\frac{1}{2}$	68 $\frac{1}{2}$	2	
10	19 $\frac{1}{2}$	59	62	3	
11	24	59	62 $\frac{1}{2}$	3 $\frac{1}{2}$	
12	24	61	63 $\frac{1}{2}$	2 $\frac{1}{2}$	

TABLE IV.

REGISTER of Plants Distributed.

NAMES.	STATION.	Number of Plants.
Mr. F. N. Maltby - - -	Travancore - - -	16
Dr. Junghuhn - - -	Java - - -	56
Mr. A. R. Lascelles - - -	Ootacamund - - -	12
Mr. M. Anderson - - -	Jamaica - - -	2
Dr. Wiehe - - -	Bombay - - -	10
Dr. T. Anderson - - -	Calcutta - - -	554
Dr. Jamieson - - -	Saharanpore - - -	107
Professor Lees - - -	Calcutta - - -	547
Rajah of Travancore - - -	Travancore - - -	521
Major Morgan - - -	Ootacamund - - -	1,534
Mr. E. T. Fitzgerald - - -	Calcutta - - -	405
Mr. J. W. B. Money - - -	- ditto - - -	1,369
Dr. W. Bourne - - -	- ditto - - -	532
Captain Cox - - -	Wynad - - -	6
Mr. Hallock - - -	- ditto - - -	2
Mr. T. Sheffield - - -	Ootacamund - - -	12
Dr. E. Day - - -	Cochin - - -	100
Mr. Brown - - -	Tellicherry - - -	12
Mr. J. Hall - - -	Ootacamund - - -	144
Mr. J. Knop - - -	- ditto - - -	18
Captain Lees - - -	Bengal - - -	281
Mr. W. H. Rayne - - -	Manantoddy - - -	24
Reverend — Sawyer - - -	Ootacamund - - -	1,018
Mr. Frend - - -	- ditto - - -	112
Mr. Hallock - - -	- ditto - - -	1
Mr. J. Perie - - -	Seegoor - - -	12
Colonel Scott - - -	Ootacamund - - -	1,126
Mr. Berend - - -	Cachar - - -	275
Rev. J. Hunter - - -	Coonoor - - -	12
Mr. J. Mullaly - - -	- ditto - - -	24
Mr. W. H. Stanes - - -	- ditto - - -	12
Colonel R. Cooper - - -	Kotagherry - - -	12
Mr. F. Cockburn - - -	- ditto - - -	12
Colonel Woodfall - - -	Coonoor - - -	12

The number of plants issued to the public is 1,208, making the total number of plants distributed 46,106.

TABLE IV.—REGISTER of Plants Distributed—*continued*.

NAMES.	STATION.	Number of Plants.	REMARKS.
Mr. C. Anderson - - -	Coonoor - - -	24	
Colonel Angelo - - -	Ootacamund - - -	12	
Rev. E. Laseron - - -	- ditto - - -	12	
Captain R. N. Taylor - - -	Coorg - - -	96	
Major W. Agnew - - -	Assam - - -	139	
Mr. V. H. Levinge - - -	Madura - - -	12	
Chief Commissioner - - -	Nagpore - - -	28	
Mr. Fletcher - - -	Ootacamund - - -	24	
Gool Mahomed - - -	- ditto - - -	20	
General McCleverty - - -	New Zealand - - -	23	
Mr. W. Robinson - - -	Kotagherry - - -	18	
Mr. Crake - - -	Wynad - - -	12	
Mr. H. R. Dawson - - -	Seegoor - - -	12	
Captain Mann - - -	Coorg - - -	48	
Mr. E. Roberts - - -	Ootacamund - - -	30	
Mr. H. Russell - - -	Wynad - - -	12	
Rev. -- Wait - - -	Coonoor - - -	2	
Mr. H. de Facien - - -	Katary - - -	5,189	
Collector of Belgaum - - -	Belgaum - - -	28	
Collector of Honore - - -	Honore - - -	28	
Dr. Ross - - -	- ditto - - -	15	
His Excellency the Governor	Bombay - - -	158	
Mr. H. Hinde - - -	Wynad - - -	12	
Mr. E. B. Thomas - - -	Coonoor - - -	12	
Rajah of Poonganoor - - -	Poonganoor - - -	12	
Major Grant - - -	Wellington - - -	226	
Messrs. Thomson, Shaw & Co.	Poonganoor - - -	28	
Mr. J. H. Trinson - - -	- ditto - - -	31	
Dr. Muller - - -	Melbourne - - -	28	
Mr. Tyrrell - - -	Mysore - - -	12	
Dr. Sayers - - -	Vellore - - -	12	
Major C. P. Taylor - - -	Ootacamund - - -	5,250	
Dr. Wilson - - -	- ditto - - -	6	
Mr. Schnarie - - -	- ditto - - -	15,000	
Captain Fuller - - -	Coonoor - - -	266	
Mr. Drummond - - -	Ootacamund - - -	224	
Captain Jennings - - -	- ditto - - -	1,756	
Lieut. H. B. Montmorency - - -	Bangalore - - -	6	
Mr. McHutchin - - -	Ootacamund - - -	3	
Colonel Molesworth - - -	- ditto - - -	6	
Mr. C. Gray - - -	Coonoor - - -	12	
Mr. H. B. Liddell - - -	Ootacamund - - -	12	
Mr. Minchin - - -	Wynad - - -	1,600	
His Excellency the Governor	Vizagapatam - - -	35	
Mr. R. F. Phillips - - -	Kotagherry - - -	1,117	
Colonel Cooke - - -	- ditto - - -	24	
Mr. G. J. Glasson - - -	Wynad - - -	1,000	
Dr. Macpherson - - -	Mercara - - -	400	
Mr. W. H. Kerr - - -	Coorg - - -	3,100	
Mr. James - - -	Ootacamund - - -	1,000	
Colonel Whish - - -	Bengal - - -	82	
TOTAL Number of Plants - - -		46,106	

Ootacamund,
12 October 1864.

(signed) *W. G. McIvor*,
Superintendent Government Chinchona Plantations.

— No. 31.—

From the Government of Madras to the Secretary of State for India.

Madras, 25 November 1864.

WE have the honour to forward for your information the accompanying tabular Report on the number, condition, &c., of the Chinchona plants on the Neilgherries, on the 31st October 1864.

Enclosure in No. 31.

REPORT on the Number, Distribution, and Condition of Chinchona Plants on the Neilgherries, on the 31st October 1864.

No. of Species.	Botanical Names.	Commercial Names.	Number of Plants.	Value per Lb. of Dry Bark in the London Market.	REMARKS.
				<i>s. d.</i> <i>s. d.</i>	
1	<i>C. succirubra</i> - -	Red Bark - - -	121,646	2 6 to 8 9	The number of plants permanently planted out in the plantations has been reduced from 173,551 to 165,351, in consequence of 8,200 transplanted plants being removed from the Pycara avenue to the nursery beds on the eastern side of the hill, in obedience to instructions conveyed in G. O. No. 1,794, dated 28th September 1864.
2	<i>C. Calisaya</i> - - -	Yellow Bark - - -	2,527	2 10 to 7 -	
3	<i>C. officinalis</i> , var. <i>Condaminea</i> (C. <i>Uritusinga</i>).	Original Loxa Bark	1,737	2 10 to 7 -	
4	<i>C. officinalis</i> , var. <i>Bonplandiana</i> (C. <i>Chahuarguera</i>).	Select Crown Bark -	300,817	2 10 to 7 -	The increase by propagation is 15,800, being 7,223 plants under the average of the last six months, making the total number of plants at the end of the month 457,988.
5	<i>C. crespilla</i> - - -	Fine Grey Bark	2,304	2 10 to 6 -	
6	<i>C. lancifolia</i> - - -	Pitayo Bark - - -	20	1 8 to 2 10	
7	<i>C. nitida</i> - - -	Genuine Grey Bark -	8,494	1 8 to 2 9	
8	<i>C. species</i> without name.	Fine Grey Bark - -	2,786	1 8 to 2 10	
9	<i>C. micrantha</i> - - -	Grey Bark - - -	13,854	1 8 to 2 9	
10	<i>C. Peruviana</i> - - -	Finest Grey Bark -	3,378	1 8 to 2 10	
11	<i>C. Pahudiana</i> - - -	Unknown - - -	425	Worthless.	
TOTAL Number of Plants - - -			457,988		

TABLE II.

MEMORANDUM of the Growth of Eleven Plants of *C. succirubra*, planted on the Second Denison Plantation, at Neddivuttum, on 30 August 1862.

Number of Plants.	Height in Inches when Planted on 30 August 1862.	Height in Inches on 30 September 1864.	Height in Inches on 31 October 1864.	Height in Inches during October 1864.	By whom Planted.
1	23	105	106	1	His Excellency Sir William Denison.
2	16½	96	99	3	
3	19	96	102	6	
4	15	96½	97	0½	
5	27	113½	114½	1	
6	20	85	86½	1½	J. W. Brecks, Esq. Dr. Sanderson. J. D. Sim, Esq. Lieutenant McLeod. P. Grant, Esq. Plant cut down for bark.
7	20	104½	106½	2	
8	18	100½	105½	5	
9	20	103	108	5	
10	20	106½	110	3½	
11	18	95½	96	0½	
12	-	48	51	3	

TABLE II. exhibits the growth of eleven plants of *Chinchona succirubra*, planted out by His Excellency the Governor, and other gentlemen at Neddivuttum, on the 30th August 1862. The average growth of these plants during the month is 2½ inches, being ½ an inch above the growth of last month.

One of the two plants cut down on the 20th of March 1863 for the bark submitted to Mr. Howard for analysis, has made strong shoots of 51 inches in height, giving the growth of 3 inches during the month.

TABLE III.

SHOWING the Height of Twelve Plants of *C. officinalis*, planted on the Dodabetta Plantation at Ootacamund, on the 30th September 1863.

Number of Plants.	Height in Inches when Planted on 30 September 1863.	Height in Inches on 30 September 1864.	Height in Inches on 31 October 1864.	Growth in Inches during October 1864.	REMARKS.
1	22	59	61½	2½	The twelve plants of <i>Chinchona officinalis</i> (a shrubby species), on the Dodabetta Plantation, gives an average growth of 2¼ inches or ½ inch under the growth of last month.
2	16½	50	53	3	
3	31½	64	66½	2½	
4	25	63½	66	2½	
5	24½	60	63	3	
6	31½	66½	70	3½	
7	25	59	62	3	
8	27	60½	63	2½	
9	26½	68½	71	2½	
10	23½	62	65½	3½	
11	26½	62½	66	3½	
12	26	63½	66	2½	

TABLE IV.

Register of Chinchona Plants Distributed.

NAMES.	STATION.	Number of Plants.
Mr. F. N. Maltby - - - -	Travancore - - -	16
Dr. Junghuhn - - - -	Java - - -	56
Mr. A. R. Lascelles - - -	Ootacamund - - -	12
Mr. M. Anderson - - - -	Jamaica - - -	2
Dr. Wiehe - - - -	Bombay - - -	10
Dr. T. Anderson - - - -	Calcutta - - -	554
Dr. Jamieson - - - -	Saharanpore - - -	107
Professor Lees - - - -	Calcutta - - -	547
Rajah of Travancore - - -	Travancore - - -	521
Major Morgan - - - -	Ootacamund - - -	1,534
Mr. E. T. Fitzgerald - - -	Calcutta - - -	405
Mr. J. W. B. Money - - -	- ditto - - -	1,369
Dr. W. Bourne - - - -	- ditto - - -	532
Captain Cox - - - -	Wynad - - -	6
Mr. Hollock - - - -	- ditto - - -	2
Mr. T. Sheffield - - - -	Ootacamund - - -	12
Dr. F. Day - - - -	Cochin - - -	100
Mr. Brown - - - -	Tellicherry - - -	12
Mr. J. Hall - - - -	Ootacamund - - -	144
Mr. J. Knop - - - -	- ditto - - -	18
Captain Lees - - - -	Bengal - - -	281
Mr. W. H. Rayne - - - -	Manantoddy - - -	424
Reverend -- Sawyer - - -	Ootacamund - - -	1,018
M. Frend - - - -	- ditto - - -	112
Mr. Hollock - - - -	- ditto - - -	1
M. J. Perie - - - -	Seegoor - - -	12
Colonel Scott - - - -	Ootacamund - - -	1,126
Mr. Berend - - - -	Cachar - - -	275
Reverend J. Hunter - - -	Coonoor - - -	12
Mr. J. Mullaly - - - -	- ditto - - -	24
Mr. W. H. Stanes - - - -	- ditto - - -	262
Colonel R. Cooper - - - -	Kotagherry - - -	12
Mr. F. Cockburn - - - -	- ditto - - -	12
Colonel Woodfall - - - -	Coonoor - - -	12
Mr. C. Anderson - - - -	- ditto - - -	24
Colonel Angelo - - - -	Ootacamund - - -	12
Reverend E. Laseron - - -	- ditto - - -	12
Captain R. N. Taylor - - -	Coorg - - -	96
Major W. Agnew - - - -	Assam - - -	139
Mr. V. H. Levinge - - - -	Madura - - -	12
Chief Commissioner - - -	Nagpore - - -	28
Mr. Fletcher - - - -	Ootacamund - - -	24
Gool Mahomed - - - -	- ditto - - -	20

The number of plants issued to the public is 3,103, making the total number of plants distributed 49,209.

TABLE IV.—REGISTER of Chinchona Plants Distributed—*continued*.

NAMES.	STATIONS.	Number of Plants.	REMARKS.
General McCleverty - - -	New Zealand - - -	23	
Mr. W. Robinson - - -	Kotagherry - - -	30	
Mr. Crake - - -	Wynad - - -	12	
Mr. H. R. Dawson - - -	Seegoor - - -	12	
Captain Mann - - -	Coorg - - -	48	
Mr. E. Roberts - - -	Ootacamund - - -	530	
Mr. H. Russell - - -	Wynad - - -	12	
Rev. — Wait - - -	Coonoor - - -	2	
Mr. H. de Facien - - -	Katary - - -	6,821	
Collector of Belgaum - - -	Belgaum - - -	28	
Collector of Honore - - -	Honore - - -	28	
Dr. Ross - - -	- ditto - - -	15	
His Excellency the Governor - - -	Bombay - - -	158	
Mr. H. Hinde - - -	Wynad - - -	12	
Mr. E. B. Thomas - - -	Coonoor - - -	12	
Rajah of Poonganoor - - -	Poonganoor - - -	12	
Major Grant - - -	Wellington - - -	226	
Messrs. Thomson, Shaw & Co. - - -	Poonganoor - - -	28	
Mr. J. H. Trinson - - -	- ditto - - -	31	
Dr. Muller - - -	Melbourne - - -	28	
Mr. Tyrrell - - -	Mysore - - -	12	
Dr. Sayers - - -	Vellore - - -	12	
Major C. P. Taylor - - -	Ootacamund - - -	5,250	
Dr. Wilson - - -	- ditto - - -	6	
Mr. Schnarrie - - -	- ditto - - -	15,000	
Captain Fuller - - -	Coonoor - - -	266	
Mr. Drummond - - -	Ootacamund - - -	224	
Captain Jennings - - -	- ditto - - -	1,756	
Lieut. H. B. Montmorency - - -	Bangalore - - -	6	
Mr. McHutchin - - -	Ootacamund - - -	3	
Colonel Molesworth - - -	- ditto - - -	6	
Mr. C. Gray - - -	Coonoor - - -	12	
Mr. H. Liddell - - -	Ootacamund - - -	12	
Mr. Minchin - - -	Wynad - - -	1,600	
His Excellency the Governor - - -	Vizagapatam - - -	35	
Mr. R. F. Phillips - - -	Kotagherry - - -	1,117	
Colonel Cooke - - -	- ditto - - -	24	
Mr. G. J. Glasson - - -	Wynad - - -	1,000	
Mr. W. H. Kerr - - -	Coorg - - -	3,100	
Mr. James - - -	Ootacamund - - -	1,000	
Colonel Whish - - -	Bengal - - -	82	
Dr. Macpherson - - -	Mercara - - -	400	
Major Sweet - - -	Katary - - -	102	
Captain Campbell - - -	Bangalore - - -	6	
Royal Botanical Gardens - - -	Mauritius - - -	36	
Hon. W. R. Arbutnott - - -	Madras - - -	93	
Hamilton Maxwell, Esq. - - -	Bombay - - -	50	
Mr. C. Smith - - -	Wynad - - -	22	
TOTAL Number of Plants - - -		49,209	

Ootacamund,
21 November 1864.

(signed) *W. G. McIvor*,
Superintendent, Government Chinchona Plantations.

— No. 32. —

From the Government of Madras to the Secretary of State for India.

Madras, 22 December 1864.

WE have the honour to forward for your information the accompanying Tabular Report on the number, condition, &c., of the Chinchona plants on the Neilgherries, on the 30th November 1864.

Enclosure in No. 32.

REPORT on the Number, Distribution, and Condition of Chinchona Plants on the Neilgherries, on 30 November 1864.

No. of Species.	Botanical Names.	Commercial Names.	Number of Plants.	Value per Lb. of Dry Bark in the London Market.	REMARKS.
				<i>s. d.</i> <i>s. d.</i>	
1	<i>C. succirubra</i> - -	Red Bark - -	129,811	2 6 to 8 9	The planting season having passed, the number of plants permanently planted out in the plantations remain the same as in the end of last month, namely, 165,351. The increase by propagation is 20,606, being 376 plants under the average of the last six months, making the total number of plants at the end of the month 475,646.
2	<i>C. Calisaya</i> - -	Yellow Bark - -	2,508	2 10 to 7 -	
3	<i>C. officinalis</i> , var. <i>Condamenia</i> (<i>C. Uritus-singa</i>).	Original Loxa Bark	2,255	2 10 to 7 -	
4	<i>C. officinalis</i> , var. <i>Bonplandiana</i> (<i>C. Chahuarguera</i>).	Select Crown Bark -	309,508	2 10 to 7 -	
5	<i>C. crespilla</i> - -	Fine Crown Bark -	2,357	2 10 to 6 -	
6	<i>C. lancifolia</i> - -	Pitayo Bark - -	26	1 8 to 2 10	
7	<i>C. nitida</i> - -	Genuine Grey Bark -	8,494	1 8 to 2 9	
8	<i>C. Species</i> without name.	Fine Grey Bark -	2,786	1 8 to 2 10	
9	<i>C. micrantha</i> - -	Grey Bark - -	14,104	1 8 to 2 9	
10	<i>C. Peruviana</i> - -	Finest Grey Bark -	3,372	1 8 to 2 10	
11	<i>C. Pahudiana</i> - -	Unknown - -	425	Worthless.	
TOTAL Number of Plants - - -			475,646		

TABLE II.

MEMORANDUM of the Growth of Eleven Plants of *C. succirubra*, Planted on the Second Denison Plantation, at Neddivuttum, on 30 August 1862.

Number of Plants.	Height in Inches when Planted on 30 August 1862.	Height in Inches on 31 October 1864.	Height in Inches on 30 November 1864.	Growth in Inches during November 1864.	By whom Planted.
1	23	106	111	5	His Excellency Sir W. Denison.
2	16½	99	100¾	1¾	
3	19	102	104½	2½	
4	15	97	98½	1½	
5	27	114½	117	2½	
6	20	86½	88	1½	J. W. Breeks, Esq. Dr. Sanderson. J. D. Sim, Esq. Lieutenant McLeod. P. Grant, Esq. Plant cut down for bark.
7	20	103½	107½	1	
8	18	105½	109	3½	
9	20	108	111½	3½	
10	20	110	112¾	2¾	
11	18	96	98	2	
12	- -	51	52	1	

Table II. exhibits the growth of 11 plants of *Chinchona succirubra* planted out by his Excellency the Governor and other gentlemen, at Neddivuttum, on the 30th August 1862. The average growth of these plants during the month is 2¼ inches, being ¼ inch below the growth of last month.

One of the two plants cut down on the 20th of March 1863 for bark, submitted to Mr. Howard for analysis, has made strong shoots of 52 inches in height, giving the growth of one inch during the month.

TABLE III.

Showing the Height of Twelve Plants of *C. officinalis*, planted on the Dodabetta Plantation, at Ootacamund, on the 30th September 1863.

Number of Plants.	Height in Inches when Planted on 30 September 1863.	Height in Inches on 31 October 1864.	Height in Inches on 30 November 1864.	Growth in Inches during November 1864.	REMARKS.
1	22	61½	65	3½	The 12 plants of <i>Chinchona officinalis</i> (a shrubby species), on the Dodabetta Plantation, give an average growth of 3 inches, or ¼ inch above the growth of last month.
2	16½	53	55½	2½	
3	31½	66½	70½	3½	
4	25	66	72	6	
5	24½	63	66½	3½	
6	31½	70	73	3	
7	25	62	65	3	
8	27	63	65½	2½	
9	26½	71	72½	1½	
10	23½	65½	68	2½	
11	26½	66	69½	3½	
12	25	66	69	3	

TABLE IV.

REGISTER of Chinchona Plants Distributed.

NAMES.	STATIONS.	Number of Plants.
Mr. F. N. Maltby - - - -	Travancore - - - -	16
Dr. Junghuhn - - - -	Java - - - -	56
Mr. A. R. Lascelles - - - -	Ootacamund - - - -	12
Mr. M. Anderson - - - -	Jamaica - - - -	2
Dr. Wiehe - - - -	Bombay - - - -	10
Dr. T. Anderson - - - -	Calcutta - - - -	554
Dr. Jamieson - - - -	Saharanpore - - - -	107
Professor Lees - - - -	Calcutta - - - -	547
Rajah of Travancore - - - -	Travancore - - - -	521
Major Morgan - - - -	Ootacamund - - - -	1,534
Mr. E. T. Fitzgerald - - - -	Calcutta - - - -	558
Mr. J. W. B. Money - - - -	- ditto - - - -	1,369
Dr. W. Bourne - - - -	- ditto - - - -	532
Captain Cox - - - -	Wynad - - - -	6
Mr. Hollock - - - -	- ditto - - - -	2
Mr. T. Sheffield - - - -	Ootacamund - - - -	12
Dr. F. Day - - - -	Cochin - - - -	100
Mr. Brown - - - -	Tellicherry - - - -	12
Mr. J. Hall - - - -	Ootacamund - - - -	144
Mr. J. Knop - - - -	- ditto - - - -	18
Captain Lees - - - -	Bengal - - - -	281
Mr. W. H. Rayne - - - -	Manantoddy - - - -	24
Rev. — Sawyer - - - -	Ootacamund - - - -	1,018
Mr. Frend - - - -	- ditto - - - -	112
Mr. Hollock - - - -	- ditto - - - -	1
Mr. J. Pierie - - - -	Seegoor - - - -	12
Colonel Scott - - - -	Ootacamund - - - -	1,226
Mr. Berend - - - -	Cachar - - - -	275
Rev. J. Hunter - - - -	Coonoor - - - -	12
Mr. J. Mullaly - - - -	- ditto - - - -	24
Mr. W. H. Stanes - - - -	- ditto - - - -	1,262
Colonel R. Cooper - - - -	Kotagherry - - - -	12
Mr. F. Cockburn - - - -	- ditto - - - -	12
Colonel Woodfall - - - -	Coonoor - - - -	12
Mr. C. Anderson - - - -	- ditto - - - -	24
Colonel Angelo - - - -	Ootacamund - - - -	12
Rev. E. Laseron - - - -	- ditto - - - -	12
Captain R. N. Taylor - - - -	Coorg - - - -	96
Major W. Agnew - - - -	Assam - - - -	139
Mr. V. H. Levinge - - - -	Madura - - - -	12
Chief Commissioner of Nagpore - - - -	Nagpore - - - -	28
Mr. Fletcher - - - -	Ootacamund - - - -	24
Gool Mahomed - - - -	- ditto - - - -	20

The number of plants issued to the public is 2,948, making the total number of plants distributed 52,157.

TABLE IV.—Register of Chinchona Plants Distributed—*continued*.

NAMES.	STATIONS.	Number of Plants.	REMARKS.
General McCleverty - - -	New Zealand - - -	23	
Mr. W. Robinson - - -	Kotagherry - - -	18	
Mr. Crake - - -	Wynad - - -	12	
Mr. H. R. Dawson - - -	Seegoor - - -	12	
Captain Mann - - -	Coorg - - -	48	
Mr. E. Roberts - - -	Ootacamund - - -	30	
Mr. H. Russell - - -	Wynad - - -	12	
Rev. — Wait - - -	Coonoor - - -	2	
Collector of Belgaum - - -	Belgaum - - -	28	
Collector of Honore - - -	Honore - - -	28	
Dr. Ross - - -	- ditto - - -	15	
His Excellency the Governor - - -	Bombay - - -	158	
Mr. H. Hinde - - -	Wynad - - -	12	
Mr. E. B. Thomas - - -	Coonoor - - -	12	
Rajah of Poonganoor, - - -	Poonganoor - - -	12	
Major Grant - - -	Wellington - - -	226	
Messrs. Thomas, Shaw & Co. - - -	Poonganoor - - -	28	
Mr. J. H. Trinson - - -	- ditto - - -	31	
Dr. Muller - - -	Melbourne - - -	28	
Mr. Tyrrell - - -	Mysore - - -	12	
Dr. Sayers - - -	Vellore - - -	12	
Major C. P. Taylor - - -	Ootacamund - - -	5,250	
Dr. Wilson - - -	- ditto - - -	6	
Mr. Schnarrie - - -	- ditto - - -	15,000	
Captain Fuller - - -	Coonoor - - -	266	
Mr. Drummond - - -	Ootacamund - - -	224	
Captain Jennings - - -	- ditto - - -	1,756	
Lieut. H. B. Montmorency - - -	Bangalore - - -	6	
Mr. McHutchin - - -	Ootacamund - - -	3	
Colonel Molesworth - - -	- ditto - - -	6	
Mr. C. Gray - - -	Coonoor - - -	12	
Mr. H. B. Leddell - - -	Ootacamund - - -	12	
Mr. Minchin - - -	Wynad - - -	1,600	
His Excellency the Governor - - -	Vizagapatam - - -	35	
Mr. R. F. Phillips - - -	Kotagherry - - -	1,117	
Colonel Cooke - - -	- ditto - - -	24	
Mr. G. J. Glasson - - -	Wynad - - -	1,000	
Dr. Macpherson - - -	Mercara - - -	400	
Mr. W. H. Kerr - - -	Coorg - - -	3,100	
Mr. James - - -	Ootacamund - - -	1,000	
Colonel Whish - - -	Bengal - - -	82	
Mr. K. Mair - - -	Calcutta - - -	1,180	
Mr. W. Shakespear - - -	- ditto - - -	61	
Mr. E. E. Meakin - - -	- ditto - - -	168	
Mr. C. Ackland - - -	- ditto - - -	150	
Mr. K. McIver - - -	- ditto - - -	124	
Mr. Havelock - - -	Ootacamund - - -	12	
Mr. W. Robinson - - -	Kotagherry - - -	12	
Mr. H. De Facien - - -	Kartairy - - -	6,821	
Major Sweet - - -	- ditto - - -	102	
Captain Campbell - - -	Bangalore - - -	6	
Royal Gardens - - -	Mauritius - - -	36	
Hon. W. R. Arbuthnot - - -	- - -	93	
Mr. H. Maxwell - - -	Bombay - - -	50	
Mrs. C. Smith - - -	Wynad - - -	22	
Mr. Rayne - - -	Manantoddy - - -	400	
Mr. E. Roberts - - -	Coorg - - -	500	
TOTAL Number of Plants - - -		52,157	

Ootacamund,
17 December 1864.

(signed) *W. G. McIvor*,
Superintendent Government Chinchona Plantations.

— No. 33. —

From the Government of Madras to the Secretary of State for India.

Madras, 11 January 1865.

1. WE have the honour to forward for your information the accompanying papers respecting the conduct of Mr. McIvor, the Superintendent of the Chinchona Plantations, in having, contrary to our orders, cut an avenue through the forest in the immediate neighbourhood of the Pykara waterfalls.

2. Mr. McIvor has rendered such important service in connection with the introduction of the chinchona into India, that we felt much regret in recording our serious dissatisfaction with him in this matter, but the tone and tenor of his letter of the 11th October last left us no alternative but to vindicate our authority in decided terms.

3. Mr. McIvor has since apologised for this very reprehensible letter, and withdrawn his resignation; we need not therefore dwell further on it.

4. Independent of the occurrence now reported, we feel very strongly the necessity of having at our command a person competent to take charge of the plantations, in the event of Mr. McIvor's death, illness, or resignation. The superintendents of the different plantations, though doubtless quite qualified for their subordinate positions, are not competent to undertake the charge of the entire experiment; and the interests at stake quite warrant the addition to the establishment of a deputy superintendent on a salary sufficiently liberal to ensure the peculiar qualifications necessary.

Enclosure 1, in No. 33.

From Lieutenant Colonel *Douglas Hamilton*, 44th Regiment Native Infantry, on special duty visiting Hill Ranges, to *A. J. Arbuthnot*, Esq., Chief Secretary to Government, Fort St. George.

Ootacamund, 2 January 1863.

1. REFERRING to my letter, dated 29th October 1862, in which I proposed visiting the Bullerungam Mountains in Mysore, I have the honour to state that from information received regarding a range of hills near Manantoddy, called the Bramagherries, situated in proximity to the Wynaad coffee estates on the borders of the Heggadavencotta talook, in the Astragram division, on the summit of which I understand there is a fine plateau at an elevation of about 6,000 feet above the level of the sea, easy of access, it may be considered of more importance, with reference to their locality, that in the first instance this range, hitherto I believe unexplored, should be visited and reported on; and which, with the sanction of Government, I purpose doing during the present cold season.

2. I trust it will not be considered out of place if I mention, for the consideration of Government, that the site lately selected for chinchona operations, in the valley of the Pykara river, will materially affect one of the most picturesque and beautiful spots on the Neilgherries, the hanging wood over the falls of the river being doomed to destruction, thereby utterly depriving the scene of its chief ornament. The Pykara Falls is one of the sights on the hills, much appreciated by residents and visited by strangers.

3. I fear, however, in bringing this to notice, I may be too late, as I perceive operations have already commenced, but I deem it advisable to mention it for the information of Government, as a large portion of the same shola at the back of the hill, in the eastern slope, seems equally well adapted for the purpose, and I would venture to suggest that the whole of the forest within sight of the falls may, if possible, be preserved intact.

Enclosure 2, in No. 33.

Order of the Madras Government, 6 January 1863.

1. THE attention of the Collector of Coimbatore will be drawn to the representation made by Lieutenant Colonel Hamilton, regarding the operations now in progress for opening a chinchona plantation in the neighbourhood of the Pykara waterfall. Mr. McIvor was some time ago instructed to leave a sufficient fringe of wood along the banks of the river; but, from information which has reached the Government, it is understood that a clearing has been made, and a hut erected immediately in sight of the lower waterfall.

fall. Mr. McIvor will now be directed, by telegraph, to suspend his felling operations until the locality can be visited by the Collector, who will inspect it with as little delay as possible in company with Mr. McIvor, and will select a site for the plantation sufficiently remote from the river, not to interfere with the scenery about the falls. Colonel Hamilton, it is observed, speaks of there being a large portion of the same wood on the eastern slope of the hill above the falls which appears to be equally adapted for chinchona cultivation.

2. Ordered, that the following telegram be despatched:—

“Stop felling the wood near the Pykara Falls until further orders. This order must be acted on immediately.”

(signed) *J. D. Sim,*
Secretary to Government.

Enclosure 3, in No. 33.

From *W. G. McIvor*, Esq., Superintendent, Government Chinchona Plantations, to
J. D. Sim, Esq., Secretary to Government, Revenue Department, Madras.

Sir,

Ootacamund, 7 January 1863.

1. LAST evening I had the honour to receive the telegram marginally noted;* and, as there appears to be some misapprehension, I hasten to inform the Government that not a tree has been felled near the Pykara Falls since November last, and then only a space of one acre for a nursery; the reason why I selected this spot for the first nursery was that it was considerably removed from the forest we intended to fell for the chinchona plantations, and consequently the plants would not be damaged by the fire while burning the forest; it was also convenient for watering. Although this small piece was felled in November, it is only now sufficiently dry to admit of the operations of lopping and burning, and preparing the nursery beds; a few men at the present moment are employed at this work, and perhaps visitors to the falls have erroneously conceived these operations to be the precursor of the destruction of the entire forest. Such, however, is not the case, as it never was intended to fell another tree on the waterfall face of the hills.

2. The forest now being felled for the chinchona plantations is not within sight of the waterfalls, being on the opposite face of the hills, viz., north and east, while the forest on the waterfall side faces west and south, being an exposure unsuited for the growth of chinchonas, and consequently it never was intended to fell this forest for a chinchona plantation.

3. The formation of the chinchona plantation in the neighbourhood of the falls, so far from detracting from the charms nature has given to this spot, will, I submit, vastly add to them, inasmuch as the roads formed for the plantations will render the waterfalls easily accessible, and available for hundreds who under present circumstances cannot visit them.

Enclosure 4, in No. 33.

From *P. Grant*, Esq., Collector of Coimbatore, to *J. D. Sim*, Esq., Secretary to Government, Revenue Department.

Sir,

Coimbatore, 15 January 1863.

I HAVE received Proceedings of Government, Revenue Department, and their order thereon, dated 6th January 1863, No. 7, and in accordance with the instructions contained therein have visited the proposed site for the Pykara chinchona plantation. The plantation will not be within sight of the falls, but on the eastern slope of the hill, that locality in fact pointed out by Colonel Hamilton as best suited for the purpose. The felling of the jungle is now being carried on there, and has not been interfered with pending further orders from Government, as it is of importance that it should be speedily finished, and there can be no doubt as to the judicious selection of the site. At the lower extremity of the Sholah hanging over the falls, one acre of wood was felled (in September or October I think) for a nursery, which is now being formed. No further felling was contemplated there; the nursery will be removed this year and its site planted out with chinchonas. Mr. McIvor choose this spot for the nursery, as he was afraid to form it on the side of the hill, where the plantation is to be, in case of any injury to the young plants from fire when the felled jungle is fired. I believe the precaution to be a judicious one. Mr. McIvor seems to be quite as enthusiastic in his admiration of the falls and the surrounding scenery as most people, and I venture to express an opinion that within the next twelve months they will be rendered more accessible and attractive than they have hitherto been.

* No. 8. Message received by Telegraph.

From Secretary to Government, Madras, to *W. G. McIvor*, Esq., Ooty.
Words 21.

Stop felling the wood near the Pykara Falls until further orders. This order must be acted on immediately. 6th-17-5.

Her Majesty's Telegraph Office, 6 January 1863.

(signed) *J. Knop*, Inspector in Charge.

Enclosure 5, in No. 33.

Memorandum by *A. J. Arbuthnot*, Esq., Chief Secretary to the Government of Fort St. George.

8 August 1864.

1. HAVING a few days ago visited the Pykara waterfalls, I think it right to bring to the notice of Government that the orders passed last year, prohibiting the felling of that part of the wood which borders the river close to the falls, have been altogether disregarded. In the Order of Government in the Revenue Department, under date the 6th January 1863, consequent on a representation made by Lieutenant Colonel Hamilton in regard to the injury which would be done to the scenery at that beautiful spot by the destruction of the wood overhanging the falls, the superintendent of the chinchona plantations was directed to suspend his felling operations until the locality could be visited by the Collector who was ordered to inspect it, and to select a site for the plantation sufficiently remote from the river not to interfere with the scenery about the falls. The Collector in his reply reported that the plantation would not be within sight of the falls, but on the eastern slope of the hill; that at the lower extremity of the Shola hanging over the falls, an acre of wood had been felled for a nursery, but that no further felling was contemplated there, and that the nursery would be removed this year (1863), and its site planted out with chinchona. On this understanding, viz., that there was to be no further felling on the western slope of the hill, the Government abstained from further interference, and an order was passed to the following effect:—

“The Government are glad to find that the plantation will not affect the scenery about the Pykara Falls, within sight of which felling will not be allowed.”

2. I regret to say that, notwithstanding these orders, a large gap of from 30 to 50 yards in width has been cut through the wood, from the top of the hill to a point opposite the upper fall, utterly disfiguring the wood, and thereby destroying what was the great beauty of the view from the opposite side of the river. Moreover, the point from which the lower falls are best seen has been rendered almost inaccessible, quite so to any person not equal to considerable exertion on foot, by the felling of timber which has blocked up, and in fact obliterated, the old pathway through the wood. In the centre of the felling a riding path has been made about 12 feet in width, which is certainly an improvement on the old path, and if the clearing had been restricted to this, little or no harm would have been done; although adverting to the orders of Government, the intention of which was clearly to prohibit any felling of trees on the western slope of the hill, it seems questionable whether the superintendent was at liberty to make any such clearance without the permission of Government.

Enclosure 6, in No. 33.

ORDER of the Madras Government, 13 August 1864.

THE Governor in Council is surprised to learn that in the face of the express orders of Government, referred to in the foregoing memorandum, the Superintendent of the chinchona plantations has felled any further portion of the wood on the western slope of the hill immediately above the Pykara waterfalls. Before passing further orders on the subject, the Governor in Council resolves to call upon Mr. McIvor for an immediate explanation of his conduct.

Enclosure 7, in No. 33.

From *W. G. McIvor*, Esq., Superintendent Government Chinchona Plantations, to
J. D. Sim, Esq., Secretary to Government, Revenue Department, Madras.

Sir,

Ootacamund, 30 August 1864.

I HAVE the honour to acknowledge receipt of Government Order, No. 1465, dated 13th August 1864, and beg to explain that prior to cutting the avenue through the wood near the Pykara Falls, I had the honour to submit the proposition for the consideration of his Excellency the Governor, which being approved, as per extract in the margin,* the work was commenced.

2. I also

* To His Excellency Sir *William Denison*.

The Pykara waterfalls are almost inaccessible during the rains (the time they are in greatest perfection), owing to the leeches. I have been grieved to see ladies striving to get through the jungle. I would therefore respectfully propose, with your Excellency's permission, to cut an easy avenue of about 40 yards wide, winding from the top to the bottom of the forest, with the road in the centre, and a few lines of chinchona on each side, to give sufficient space clear of underwood to keep the leeches from the road. This I think would add much to the attractions of Pykara, and make the falls accessible at all seasons. A few arbours might also be placed on the points commanding the finest views.

Ootacamund, 16 October 1863.

(signed) *W. G. McIvor*.

Madras, Government House, 19 October 1863.

I have no objections to the arrangements you propose for Pykara; it will be a great improvement.

(signed) *W. Denison*.

2. I also respectfully beg to explain that I considered the Order of Government of 6th January 1863 to refer to the wood "overhanging the falls" where there had been no felling whatever, except to open three narrow vistas to enable visitors to obtain a view of the falls from different points. It is only through this wood that we can communicate with our plantation on the eastern side, and I did not consider that the Order of Government forbade opening a road through this part of the wood, as without this our plantation on the eastern side could not have been worked, as the natives would not pass through the wood during the rainy season on account of the leeches.

3. I must therefore disavow, both in intention and in fact, the accusation brought against me, that the Orders of Government above noted "have been altogether disregarded."

4. The work in question is as yet in an unfinished state, and as such does not appear to the advantage which it will shortly do; the greater part of the avenue is already planted with chinchonas, which will shortly present a far more beautiful appearance than the useless trees they replace, while the road in the centre of the avenue affords easy access to both the upper and lower falls. Any impression to the contrary must have arisen from following the old track instead of the new line of road.

Enclosure 8, in No. 33.

Order of the Madras Government, 28 September 1864.

1. Mr. McIVOR was not warranted in interpreting the general assent given by his Excellency the Governor to his indefinite proposal (unaccompanied by any sketch or plan showing the locality and the proposed operations), as equivalent to formal permission to depart from a plain and positive order issued by his Excellency in Council, after full consideration.

2. The Governor in Council now prohibits Mr. McIvor from interfering in any way with the western side of the hill, which will be placed exclusively under the Forest Department. The injury effected to the forest cannot be repaired by planting Australian or other trees, and the cleared spots had better be left to nature. The chinchonas should be removed to the plantation if this can be done without material danger, as they will not harmonise with the surrounding forest, otherwise the assistant conservator will take charge of them.

3. The assistant conservator will leave a sufficient breadth of pathway for Mr. McIvor's labourers, reducing its steepness, and widening it where necessary, without however cutting down any more timber. Mr. McIvor will distinctly understand that he is henceforth restricted to the use of the path for himself and his labourers, and he will incur the serious displeasure of Government if he disobeys these orders. It would be well if the assistant conservator could provide other means of access to the chinchona plantation on the eastern side of the hill.

Enclosure 9, in No. 33.

From *W. G. McIvor, Esq.*, Superintendent, Government Chinchona Plantations, to
J. D. Sim, Esq., Secretary to Government, Revenue Department, Fort St. George.

Sir,

Ootacamund, 11 October 1864.

1. I HAVE the honour to acknowledge the receipt of the Order of Government, No. 1794, dated 28th ultimo, directing the removal of the chinchona plants from the Pykara avenue, and henceforth restricting myself and labourers to the use of the path.

2. With reference to paragraph 1, while waiving the direct permission of his Excellency the Governor, obtained on a proposal which clearly defined what was intended, and what has literally been carried out in cutting the avenue leading past the Pykara Falls, to the "Wood" plantation, I do with due deference and respect, most distinctly and emphatically disavow that, in forming the road, I knowingly departed "from a plain and positive order issued by his Excellency in Council after full consideration," no order to the above purport ever having reached me. Hence it may be possible that the memorandum of the Honourable A. J. Arbuthnot has induced the Government to place on their minutes on this subject an interpretation originally never intended, as their orders refer specifically to felling within sight of the falls, and not in any way restricting me from making roads to the plantations, all orders from the Government on this subject having been correctly and literally carried out, according to the best of my judgment. The telegram and order noted in the margin, were the first I had the honour to receive, and I beg to observe that the fringe of wood along the banks of the river had not been interfered with, and that the felling of the avenue cannot be seen from either the upper or lower waterfall.

In

In my letter under date 7th January 1863, No. 80, paragraph 3, I brought to the notice of Government my intention to form roads to the plantation, passing the waterfalls, and as these roads could not be cut without felling a portion of the forest, I submit that had such been opposed to the views of Government, I should have been instructed to that effect, their silence on the subject being naturally interpreted by me into an approval; I am therefore at a loss to know on what grounds the charge has been brought against me of having disobeyed the orders of Government, in carrying out a work so essential to the maintenance of the plantation. The avenue in question, had the Government permitted it to be completed, would have added greatly to the attractions of the falls and the beauty of the scenery, inasmuch as it is the grandeur of nature combined with art, which conveys the most pleasing impressions to the mind. This is well understood by all artists of note, and is in fact the secret upon which their reputations have been built, as what would be the effect, or value of a picture of the Swiss Alps were it not for the cottage judiciously introduced into the scene, the green patch of cultivation, and the goats grazing in the foreground. These objects form the life of the picture, and the reason of their introduction is to convey the pleasing impression, that in combination with the grandeur of nature, it contributes to the comforts of the human race; while scenery however grand and majestic, without these attractions, is dead, and leaves upon the mind the painful impression of desolation, the eye vainly endeavouring to rest upon an object, conveying the idea of comfort and happiness to mankind.

3. What has been done in opening out this avenue is already appreciated by the community, as within the last two months since the road has been finished, there have been more visitors to the falls than in the twelve previous months. The average number of visitors to the falls during 1862 and 1863 varied from 32 to 40.

4. Immediately on receipt of the Government Order, and in obedience to paragraph 2, I proceeded to the "Wood" plantation, and placed every available hand to remove the Chinchona plants (upwards of 8,000, many of which had been planted for more than six months) from the avenue to the nursery beds on the eastern side of the hill. While I do not presume to solicit the favour of a reconsideration of this portion of the minute under reply, I feel confident that I shall not incur the displeasure of Government, by bringing to their notice my conscientious conviction, that this part of their order directs the removal of plants, which shortly would have formed one of the most valuable, beautiful, and interesting avenues in the world, permitting in its stead a growth of noxious weeds, this conviction being formed on the following facts, first, that several species of Chinchona stand pre-eminent as the most valuable of all vegetable products, and the avenue in question was planted with the best of these; second, that in point of beauty the Chinchona tree is inferior to none, Mr. Markham describing it as the most "beautiful and fragrant tree" of South America, Mr. Spruce as the "queen of the forest," and every traveller in South America, from the time of Humboldt up to this date, being unanimous in this opinion." What then could exceed the beauty of an avenue, nearly two miles in length, composed of such trees? Third, that the cultivation of these plants being in its infancy is one in which all scientific men take a great interest, and this avenue extending as it does from an elevation of 6,500 feet to 3,400 feet, would have shown, within a comparative short distance, the various effects of altitude upon the different species, and thus practically illustrate a most important and interesting fact; fourth, that the forests on these hills when once felled and burned, if "left to nature," not one tree in a hundred will ever grow again, the ground becoming covered by a growth of strobilanthes and weeds, principally composed of the noxious *Solanum giganteum*.

5. The Government observe that the Chinchonas "will not harmonize with the surrounding forest." I am not aware of the arguments adduced to cause this impression on the Government, but submit that in point of fact, nothing can be more erroneous, inasmuch as the indigenous forests on the Neilgherries are composed principally of chinchonaceous plants, so identical in their general resemblance with the Chinchona Uritusinga, C. Crespilla, and C. Condaminea, that it requires the experienced eye of a botanist upon close examination to distinguish the one from the other; hence, had the cause of the removal of the plants been attributed to too great harmony it might have been tenable, on the ground that this similarity would amount to monotony in the scenery, were it not that the leaves of the "red" and "grey" barks are larger and richer in colour than the majority of jungle trees, and in planting the avenue this was taken advantage of in such a manner as would have produced an effect for richness and beauty altogether unequalled in Neilgherry scenery.

6. From the date of the introduction of the Chinchona plants, objections tending to impede our progress have been continually advanced without reason or reflection; these hitherto I have cheerfully combated, being confident in the correctness of my own views, and in the hope that when I had developed these to the satisfaction of Government, as has already been done, I should be secure in their confidence and protection against further interference. The wording of the Order under reply has deprived me of this hope, and I see with apprehension objections arising from the Government itself, of so potent a nature, as to destroy in a few days the labour of years; to explain my meaning I would observe, that had I literally carried out the restrictions conveyed in paragraph 3, of the Government Order, I would have had to report to-day a loss of about 40,000 plants. Truly a more effectual plan for the destruction of the plantation could not have been conceived, for the reason that any attempt on my part to restrict my labourers to the path

would cause their immediate desertion from the plantation, as the men have hitherto been allowed to diverge from the path to obtain water, collect firewood, and other innocent purposes; to deprive the labourers of these privileges is to deprive us of their services, and at the present moment we have a newly formed nursery of about 40,000 plants, depending for their existence on the attendance of these labourers, and great as would be the damage and loss in this respect, in other ways the restrictions reduce to a certainty the total destruction both of the plantation and nursery, from the fact, that no water originates on the eastern side, the water for the irrigation of the nurseries and plantation being brought from the Pykara river, in a channel through the forest, on the western side of the hill; this channel becomes frequently choked up by accident, such as the falling of wood, passing of wild animals, &c., and although this water is indispensably necessary for the daily existence of the plants in the nurseries, and for the preservation of the plants in the plantation during the dry season, yet the Order of Government clearly indicates, that if I were to direct the men to deviate from the path to clear out this watercourse, and thus obtain that which is necessary to the very existence of the plantation, I would be guilty of a trespass, to be visited by "the serious displeasure of Government;" hence, restrictions productive of such consequences greatly discourage me, especially as the conviction is forced upon my mind, that the more perfectly I develop the success of this undertaking, the more serious will be the opposition I shall have to encounter in consequence of its arising principally from a covert feeling of class prejudice; another cause exists among the admirers of natural scenery, who conceive that Chinchona cultivation will spoil the beauty of the Neilgherries, while an equally erroneous impression exists among the members of the service who take an interest in sporting pursuits, that Chinchona cultivation will drive away the game; hence their opposition. The memorandum of the Honourable A. J. Arbuthnot, Chief Secretary to Government, owes its origin to at least one of the above influences, that gentleman having frequently asserted that the Chinchona would be the ruin of the Neilgherries, by causing the felling of the natural forests. Holding such to be the case, it is to the Right Honourable the Secretary of State for India, in Council, that the onus of the introduction of these plants is to be attached, and I submit it would have been more dignified in Mr. Arbuthnot to have brought his accusation direct against that honourable body, they being in a much better position to vindicate their proceedings than a humble individual like myself.

7. In January last Mr. Arbuthnot was aware of the opening out of the avenue and road in question, and it is much to be regretted that it was not at the time brought to the notice of Government, and thus have saved considerable expense and great waste of labour.

8. The road in question has been roughly cut out and passable for laden bullocks for the last three months; it is now finished (with the exception of 70 yards in one place, and 20 in another), effectually drained and bridged, and near the falls laid out in garden style, with grass borders, &c.; before this road was opened we could neither obtain labour nor supplies for the plantation, now we can command abundance of both; this road was further intended to connect the Neddivuttum plantations by bridging the river, and this would have enabled us to draw labour and supplies for the Neddivuttum plantations from the eastern side during the western monsoon, as at this season communication with the Neddivuttum plantations is cut off; this road also, when connected, would much reduce the labour of superintendence and cost of working the plantations.

9. I refrain from troubling the Government with farther details of the injury their restrictions will cause to the plantations, submitting it to be understood, that unless I possess the power of maintaining in good order the roads and water-courses connected with the same, diverting and altering the latter when necessary, it is impossible for me to keep up labourers and establishments, or to perform the works either to the satisfaction of the Government or myself. Under these circumstances, I hold myself released from the responsibility originally placed upon me by the Government, in connection with the Chinchona operations.

10. The restrictions placed upon me and my labourers in paragraph 3, are such as the Government have never placed upon the common native traveller on their highways, and I feel this the more when applied to myself and labourers on a road constructed for our sole benefit, combined with the fact, that in carrying out these instructions there is no object to be gained, as either myself or my labourers diverging from the path into a waste forest could not be productive of injury; I am therefore at a loss to comprehend the meaning of the severity of the restrictions, except indeed it be to render their violation inevitable, and thus subject me at any moment to dismissal with disgrace, on a plea of disobedience of orders; and however unwilling I am to detach myself from this important undertaking at the present interesting and in some respects still critical period of operations, I see with concern and apprehension that my professional reputation demands it; I therefore most respectfully solicit the permission of your honourable Government and the Secretary of State for India in Council to retire from the service, on such gratuity, pension or award, as I may be considered entitled to after 17 years' arduous and successful labour, much of which has been of a special nature, and for which I have had the honour to receive the highest testimony to my zeal, ability and integrity from your honourable Government, the Governor General, and the Right Honourable the Secretary of State for India.

Enclosure 10, in No. 33.

MEMORANDUM.

LETTER from Mr. *W. G. McIvor*, Superintendent, Government Chinchona Plantations.

Dated 11 October 1864.

1. IT is desirable that this letter, in which Mr. McIvor has thought fit to make remarks with reference to the course taken by me, in bringing to the notice of Government what I conceive to have been his disregard of the orders prohibiting the felling of the forest on the western side of the hill above the Pykara waterfall, should be accompanied by observations from me on one or two points.

2. In the 6th paragraph Mr. McIvor states, on what authority I am not aware, that I have "frequently asserted that the Chinchonas would be the ruin of the Neilgherries, by causing the felling of the natural forests." Any remarks I have made on this subject have been made in the freedom of private conversation; and they were certainly not open to the construction which Mr. McIvor has put upon them, and which implies that I am opposed to the cultivation of the Chinchona. This is altogether a mistake. No one is more sensible than I am of the importance of the work on which Mr. McIvor is engaged, and no one has been more ready to acknowledge the skill with which Mr. McIvor has conducted it. What I have said is, that if Mr. McIvor was not kept in check, serious mischief would be done by the indiscriminate felling of the hill forests, the more especially as Mr. McIvor has recently propounded, what I conceive to be a most mischievous theory, that felling the forests tends to increase the water supply. I have always considered it a matter of regret, that the site of the Pykara waterfalls, which is the most beautiful spot within easy reach of Ootacamund, should have been selected for a plantation; and I hold, and have expressed a very strong opinion as to the impropriety of Mr. McIvor's conduct in setting at nought the orders of Government, which prohibited the felling of the forest on the western side of the hill so completely as he has done.

3. The other assertion which I think it right to notice, is that in paragraph 7, where Mr. McIvor states, that in January last I was aware of the opening out of the avenue and road. This is not the case; I heard nothing of it until March or April, and it was not until I visited the spot in July, that I had any conception of the extent of the mischief.

(signed) *A. J. Arbuthnot*,
Chief Secretary.

Enclosure 11, in No. 33.

MINUTE by the Honourable *E. Maltby*.

1. I AM a stranger to the locality in question, but assented to the order of which Mr. McIvor complains, because it appeared to me that an express order of the Government, passed with the President's concurrence, had been disregarded, and that this must be noticed unless all control over Mr. McIvor's proceedings was to be abandoned. The tone of Mr. McIvor's present letter supports the view I took of the necessity of noticing his conduct, and is, in my opinion, highly censurable. I cannot suppose that Mr. McIvor would have ventured to write in such a style, unless he looks on his services as too necessary to Government to be dispensed with, or his circumstances render him independent of public employ. Had there been really any decision to make between Chinchona plantations and pleasing scenery, I should have considered the former as of too paramount importance to be sacrificed to the latter, but it cannot be said that this has been the case. The Neilgherry plateau affords abundant sites for plantations at different degrees of elevation, and Mr. McIvor has been allowed a free selection. On his wishing to try a plantation at Pykara, a suitable piece of ground was given him, under the sole restriction that the forest on the side of one hill was not to be interfered with. This restriction did not impede the formation of the plantation, and was imposed to preserve the scenery of a favourite place of resort.

2. What Mr. McIvor writes about restrictions which "greatly discourage" him, and about "a covert feeling of class prejudice" against Chinchona cultivation, is as simply preposterous as it is unbecoming. Private plantings have been numerous, and the Government records amply show that the success which has attended the experiment is as much owing to the support which Mr. McIvor has received as to his own professional skill. This skill the Government has both acknowledged and rewarded, but it is impossible for Government to permit one of its servants to address it in the manner which Mr. McIvor has now done.

3. I consider that Mr. McIvor should be informed that his resignation will be accepted unless he recalls this letter and engages to comply with the instructions which Government may from time to time issue; that his threat of retiring from "this important undertaking" on so trivial a ground, at what he describes as "the present interesting and in some respects still critical period of operation" is viewed with disapprobation, and that

any "gratuity, pension, or award" on account of past services, which he may look for from the benevolence and liberality of Government, will be affected by the conduct which he pursues on this occasion.

4. If Mr. McIvor persists in his intention of resigning, he should be required to state whether he is prepared to continue in charge of the department until a successor arrives from England. Should he decline to do so, the Government can, I doubt not, make due arrangements for the temporary care of the plantations and nurseries, and Mr. McIvor will, in my opinion, have forfeited any claim to the liberality of Government by thus abruptly quitting its service.

5. Even if Mr. McIvor continues in the public service, it seems to me essential that steps should be taken to obtain from England an assistant or deputy competent to take his place in case of need. The value of the Chinchona plantations is already great, and increases yearly, and steps should be taken to guard against the effects of the superintendent's possible illness or death. Government should also be relieved from its present comparatively helpless position, and be able to act promptly if Mr. McIvor should again presume to conduct himself as in the present instance.

6. In assenting to the removal of the Chinchonas from the avenue planted by Mr. McIvor on the forbidden hill to the adjacent plantation, I was not actuated by any idea that the line of trees would spoil the forest scenery, but by a desire to show Mr. McIvor that the instructions of Government must be obeyed. My impression was that the Chinchona plants might be 100 or at most 200 in number, but under the information now given in Captain Beddome's letter of 15th instant (circulated with these papers), I consider that these trees should remain, and that other Chinchonas and some Australian trees should be planted to fill up the gap. I am prepared to assent to Captain Beddome's suggestion that the avenue should be placed under the Chinchona superintendent, due precaution being taken against further felling of the forest.

22d October 1864.

(signed) *E. Maltby.*

Enclosure No. 12 in No. 33.

MINUTE by Sir *William Denison.*

1. I have seen, for the first time, the proceedings of Government of 28th September 1864, and have now to deal with matters arising out of these proceedings. Had these been forwarded to me previous to publication a good deal of trouble and difficulty would have been spared, and I should not have been compelled to bring the subject again under the consideration of the Government.

2. There are two matters involved in the papers before me: first, the proceedings of the Government above alluded to; second, the letter from Mr. McIvor arising out of these proceedings. I will deal with the two in the order above stated. In order, however, to bring the matter in all its bearings clearly before the Government, I must enter into some little preliminary detail. When the Government commenced the experiment of cultivating Chinchona, it entrusted the general arrangement of the plantations entirely to Mr. McIvor. He laid out the land, cleared it, made all the roads, &c., and the Government has not, except in the present instance, had any reason to complain that the confidence placed in that officer has been abused.

3. Even in the present instance I do not think that I should be justified in saying that confidence had been abused.

4. Mr. McIvor was permitted to commence a plantation in the immediate vicinity of the Pykara Falls. The Government did not ask for any plan of the ground, or for any description of the mode of access to the plantation; it gave Mr. McIvor, by implication, at all events, the same latitude, and the same discretion, which it had heretofore done, and he accordingly acted according to his judgment and taste. After a time, however, the Government was informed that the ground by the side of the river was being denuded of timber; upon this, after some correspondence with the collector, an order was issued to the following effect: "The Government are glad to find that the plantation will not affect the scenery about the Pykara Falls, within sight of which felling will not be allowed." No plans, however, were asked for; no inquiry made as to the extent of the plantation; the mode of getting access to it, &c., all was left to the discretion of Mr. McIvor. On 8th August the chief secretary, having visited the Pykara Water Falls, pointed out to the Government that Mr. McIvor had cut a large gap in the wood, in direct disobedience to the orders from Government: upon which he was called upon for an immediate explanation of his conduct. This Mr. McIvor did by quoting a letter written by me, in answer to a description given by him of the mode in which he proposed to complete the communication to the plantation, in which I gave a general approval of the scheme; and he explained that he did not consider the order of government forbade opening a road through the wood, without which the plantation could not have been worked.

5. This paper was sent to me, and I pointed out that Mr. McIvor was not justified in interpreting the assent given by me to a proposal stated by him, unaccompanied by any plan or sketch, as an order to him. I gave some opinion as to the character of the road which he had made, having visited the plantation in the interval, and I stated that I could

not

not approve of a suggestion of Mr. Pycroft, that the Chinchonas should be removed, or that an attempt, which must prove unsuccessful, should be made to restore the forest to its original state.

6. On the 28th September 1864 an order was given to the effect that the injury to the forest could not be repaired by planting Australian, or other trees, but had better be left to nature; that the Chinchonas should be removed to the plantation; that the western side of the hill should be handed over to the conservator of forests, who would leave a sufficient breadth of pathway for the labourers, and restricting Mr. McIvor to the use of the path for himself and his labourers. Had this order been sent to me before publication, I should have pointed out that the damage having been done, and the expense of clearing the forest and planting the Chinchonas incurred, it would be very bad policy, on the part of the Government, to go to the further expense of removing the plants, and re-planting them elsewhere, at the risk of the loss of a good number; that to leave the restoration of the forest in nature's hands would be, as stated by the conservator of forests, to create a mere dense, thorny jungle, which would not harmonize in any way with the forest on each side of it. That, as also suggested by the conservator, Mr. McIvor, might as well be allowed to fill the cleared land with Chinchona, a fast growing and very handsome tree.

7. I may as well state that I do not consider the beauty of the falls to be so irreparably injured as is inferred by some. Neither indeed do I agree with those who seem to think that every sacrifice should be made by the Government for the purpose of maintaining the landscape in its original form. I should not have sanctioned the cutting down of the forest had I seen a plan of the work intended previous to its commencement; but I think that a great deal more has been made of the damage to the scenery than is necessary.

8. Looking, then, to the fact that the conservator of forests is of opinion that the presence of about 25 acres of kumiry jungle will not add to the appearance of the scenery; that the Government has incurred the cost of clearing the ground, which would be lost if it were allowed to return to forest; that the Chinchona is said to be a handsome tree, and that at all events it is a profitable one; that the land in question will contain 20,000 trees, and be worth in the course of a few years at least 1,500 £. or 2,000 £. per acre, I propose that the Order of the Government of 28th September should be reconsidered, and that the land cleared should be planted with Chinchona, and left in the hands of the director of the Chinchona plantations.

9. I do not propose to exonerate Mr. McIvor from blame. Indeed, I should be disposed to have dealt with his conduct more directly, but as the opinion of the Government has already been communicated to him, I shall deal only with his letter in reply.

10. I strongly object to the tone of this letter, and am of opinion that Mr. McIvor should be told that the Government is not to be addressed in such a tone or manner by its subordinates, whose business it is to obey instructions issued to them; or, if they conceive their instructions likely to be injurious to the interests of Government, to submit their views in a proper manner for consideration.

11. With reference to Mr. McIvor's tender of his resignation, he should be informed, of course, that he is under no obligation to remain in the service of the Government; but that he has no shadow of a claim to either pension or gratuity should he choose to resign his appointment merely on the ground that he has been reprimanded for disobedience of orders.

12. Some inconvenience has evidently arisen from the amount left to the discretion of Mr. McIvor. It would be worthy of consideration whether he should not for the future be called upon to submit rough sketches of the mode in which he proposes to lay out the plantation. It may also be a matter worthy of consideration whether he should not be provided with an assistant or deputy, at a salary of, say, 300 rupees per month. At present there is no one between Mr. McIvor and the superintendents of gardeners in charge of the different plantations.

26 October 1864.

(signed) *W. T. Denison.*

Enclosure 13, in No. 33.

MINUTE by the Honourable *T. Pycroft.*

1. THERE seem to me to be two matters for consideration in connection with Mr. McIvor's late proceedings on the western side of the Pykara Falls, and with his recent letter. First, how the tract denuded by Mr. McIvor should be dealt with; and, secondly, the tone of his recent letter, and the position which he has therein assumed towards the Government.

2. As to the first, unhappily, we have but a choice of difficulties. The original forest has been laid low, and cannot be replaced in its pristine state. We must either leave the clearing to nature, in which case, as would appear from the conservator's letter, it would become overgrown with dense thorny jungle, or have it planted with Chinchona and perhaps some other trees. I do not know that the latter course is preferable to the former. The Chinchona may be a handsome tree in its native forests, and standing singly or in clumps, but planted in stiff formal lines, as it is in the Government plantations, and as it

was by Mr. McIvor on the sides of the gap which he cut in the forest, it certainly has not an ornamental appearance. However, as his Excellency the President and Mr. Maltby seem in favour of the latter mode of proceeding, I do not object. I am certainly reluctant that Mr. McIvor should have anything more to do with the tract after the way in which he has behaved; and under any circumstances, before he is allowed to meddle with it, we should know exactly how he proposes to proceed; he should work only on the plan that we may sanction, and measures should be taken for preventing any further felling on that side of the river under any pretext whatsoever.

3. With regard to the tone of Mr. McIvor's letter of the 11th ultimo, and the attitude which he has assumed in it, I entirely agree with my colleagues. A more arrogant and disrespectful document I do not remember to have seen. I would particularly draw attention to the concluding paragraph, in which he insinuates that the late orders of Government, to which he gives a meaning which he must well know they could not and were not meant to bear, were made purposely stringent so as to entrap him into disobeying them, and actually makes this the ground of his desire for retiring from the charge of the plantations. If a public servant, because his proceedings are not approved and are to some extent ordered to be reversed, is to write in this manner, there must be an end of all subordination. I would tell Mr. McIvor that the Government strongly censure the objectionable style of his last letter; that if he chooses to retire from the charge of the Chinchona plantations he may do so, but that pensions or gratuities are not bestowed on men who throw up their appointments because they cannot have their own way, and quarrel with the orders of the paramount authority. I would warn him further that if he again addressed Government in such a tone they would at once remove him from his post. This might cause some inconvenience, but would be preferable to tolerating such language from Mr. McIvor. Moreover, I do not deem his services quite so indispensable as he evidently considers them. I do not doubt that the Forest Department, with the aid of the subordinate servants in the Chinchona plantations, would keep matters going fairly enough until a skilled gardener and arboriculturist could be procured from England.

4. Reprehensible as is the style of Mr. McIvor's letter throughout, that part of it is most especially censurable in which he has made a most wanton and groundless personal attack upon the Chief Secretary, charging him with exaggerated representations made from narrow-minded motives, and indeed accusing him of disingenuous conduct in the matter. Mr. Arbuthnot's memorandum contains full explanation on both these charges. In noticing the objectionable nature of Mr. McIvor's letter, the Government should, I conceive, mark with their peculiar displeasure that part of it which contains these injurious and unfounded imputations on their chief officer.

5. During my late visit to the Neilgherries I had not an opportunity of going to the Pykara Falls. Had I foreseen the turn which this discussion has taken, I would have made a point of visiting them. I may, however, mention that more than one gentleman with whom I conversed on the subject, and whose names, were it necessary for me to give them, would be deemed a sufficient guarantee, told me that Mr. Arbuthnot's description was by no means overcharged. It will be observed that the officiating conservator of forests, in his letter, of 15th October, speaks of the extent of clearing as being very large.

6. I concur with my colleagues that it is desirable to apply to the Secretary of State for an assistant to the Chinchona superintendent of a higher order than his present subordinates, one who could take his place in the event of his death, absence from sickness, or of his relinquishment of or removal from his appointment under what we must now consider a not impossible contingency. At present there is reason to believe that, as observed by Mr. Maltby, Mr. McIvor is either independent of Government employ from private sources, or considers that he is too valuable to be spared, and is therefore emboldened to act as he has done. I would not, as I have already noticed, hesitate to undeceive him in this last view, if necessary. Still the presence on the spot of an assistant in all respects qualified to perform his duties would be a check on him and strengthen the hands of Government.

7. As Mr. McIvor maintains in his letter that in making the clearing on the west side of the falls he did not violate any express order of Government, I annex an abstract of the correspondence which took place on the subject in 1863.

On the 2d January 1863 Lieutenant Colonel Hamilton brought to the notice of Government that the site recently selected for Chinchona operations in the Pykara Valley was in the hanging wood over the falls of the river. He objected to this as mainly affecting one of the most picturesque and beautiful spots on the Neilgherries; mentioned that a large portion of the same Shola at the back of the hill on the eastern slope seemed equally well adapted for the purpose, and suggested that the whole of the forest within sight of the falls might be preserved intact.

The Government G. O., 6th January 1863, desired the collector to inspect the locality in company with Mr. McIvor, and to select a site for the plantation sufficiently remote from the river not to interfere with the scenery about the falls.

Mr. McIvor, on the 7th January 1863, in reference to a telegram ordering him to suspend felling near the Pykara Falls, said that not a tree had been felled near the falls since the previous November, and then only one acre for a nursery. This spot had been selected because it was considerably removed from the forest which was intended to be felled for the Chinchona plantations, and the plants would not be damaged by the fire whilst the forest was being burnt. It was never intended to fell another tree on the waterfall face of
the

the hills. The forest on the waterfall side faced west and south, being an exposure unsuited for the growth of Chinchona.

In his letter of 15th January 1863, Mr. Grant reported that the plantation would not be within the sight of the falls, but on the eastern slope of the hill, the locality in fact pointed out by Colonel Hamilton as best suited for the purpose. No further felling was contemplated when the nursery had been formed.

The Government (G. O. 23d January 1863), expressed their satisfaction that the plantation would not affect the scenery about the Pykara Falls, within sight of which felling would not be allowed.

Unless these papers be understood as assuring the Government that the Chinchona planting operations would be confined to the eastern slope of the hills, and that Mr. McIvor understood them in that sense, and promised to act up to them, it is difficult to say what meaning is to be extracted from them.

Again, if cutting a gap at least 40 yards wide, on the western side of the hill, where Mr. McIvor had assured Government that "it never was intended to fell another tree," and that "the exposure was unsuited to the growth of Chinchona," was not an infraction of the Government orders, it is hard to tell what disobedience of orders is.

4 November 1864.

(signed) *T. Pycroft.*

Enclosure 14, in No. 33.

From *W. G. McIvor*, Esq., Superintendent Government Chinchona Plantations, to *J. D. Sim*, Esq., Secretary to Government, Revenue Department, Fort Saint George.

Sir,

Ootacamund, 3 November 1864.

1. WITH reference to the Order of Government, 28th September 1864, No. 1794, and my letter of the 11th ultimo, No. 155, I have the honour most respectfully to bring to the notice of Government, that as an unusually severe drought has set in, and the plants upon the upper portion of the Wood plantation near Pykara are already suffering severely from want of water, and if the drought continues for a fortnight more the greater portion of them will be dead, unless immediate steps are taken to turn the water course at a higher level, in order to admit of irrigation. I would, therefore, solicit the favour of being advised by telegraph as to what steps I am to adopt in reference to this matter.

2. Further supplies of grain are also necessary for the establishment on the plantation; this I have delayed getting in as long as possible, as the loaded bullocks and men in charge of them would certainly cause an infringement of paragraph 3 of the Government Order above noted; I would, therefore, esteem it a favour my being instructed as to how to proceed in this respect.

3. I would also observe, that although I explained the orders of Government to my establishment with as much leniency as possible, since doing so I have lost one maistry with 43 of my best trained men; and I much fear that if immediate steps are not taken to remove these restrictions, at least so far as they affect my establishment, we will shortly not have a man upon the plantation; and, as the dry weather is now setting in, this would prove its total destruction.

4. I have been most unwilling to trouble the Government on this subject, and have delayed doing so in daily expectation of our usual rains, but as there is still no appearance of these, it becomes imperative that I should bring these facts to their notice.

Enclosure 15, in No. 33.

ORDER of the Madras Government, 8 November 1864.

1. IN his letter above recorded the Superintendent of Chinchona plantations submits a further explanation of his conduct in cutting an avenue through the forest in the immediate neighbourhood of the Pykara Falls.

2. As Mr. McIvor maintains that this act was not an infringement of their orders, the Government will briefly notice the correspondence on the subject.

3. On the 2d January 1863, Colonel Hamilton brought to notice, that the site selected for Chinchona operations in the valley of the Pykara river would "materially affect one of the most picturesque and beautiful spots on the Neilgherries, the hanging woods over the falls of the river being doomed to destruction, thereby utterly depriving the scene of its chief ornament." At the same time he mentioned that a large portion of the same shola, at the back of the hill on the eastern slope, seemed equally adapted for Chinchona cultivation, and suggested that the whole of the forest within sight of the falls, should, if possible, be preserved intact.

4. Mr. McIvor was directed, by telegraph, to stop felling the wood until further orders, and the collector was instructed to visit the locality with him, and "select a site for the plantation sufficiently remote from the river not to interfere with the scenery about the falls."

5. Mr. McIvor immediately replied to the telegram, and stated, that "not a tree had been felled near the Pykara Falls since November, and then only a space of one acre for a nursery;" that "it never was intended to fell another tree on the waterfall face of the hills," and that the plantation was "not within sight of the waterfalls, being on the opposite face of the hills, viz., north and east, while the forest on the waterfall sides faces west and south, being an exposure unsuited for the growth of Chinchona; and, consequently, it never was intended to fell this forest for a Chinchona plantation."

6. The collector's report was much to the same effect, and the Government Order was in the following terms:—"The Government are glad to find that the plantation will not affect the scenery about the Pykara Falls, within sight of which felling will not be allowed." These papers can be regarded in no other light than as evincing the desire of Government that the forest on the western sides of the hill should be preserved in its natural beauty, and as conveying an assurance from Mr. McIvor that this wish should be scrupulously respected. Yet it is through these very woods that Mr. McIvor has cut an avenue at least 40 yards wide.

7. Mr. McIvor argues, that in paragraph 3 of his letter of the 7th January 1863, he signified his intention to form roads to the plantation, passing the waterfalls, and that as Government did not notice this matter, he concluded that they approved of it. Mr. McIvor, in the letter referred to, certainly did mention the intended formation of roads, but not in such a manner as to lead Government to suppose that they were to pass through the very Shola in which, in the same letter, he stated "it never was intended to fell another tree." His expression was "the roads formed for the plantations will render the falls easily accessible." But, independent of this, it must be observed that even had the allusion to roads been more definite, the Government would never have supposed that Mr. McIvor meant cuttings of the width of 120 feet. They would naturally have imagined that roads of 12 or 15 feet in width were all that Mr. McIvor contemplated.

8. In paragraphs 6 and 10 of his letter of the 11th ultimo, Mr. McIvor alludes to the restrictions placed upon him in paragraph 3 of the Order of Government as unprecedented and of ruinous tendency. The paragraph limited Mr. McIvor "to the use of the path for himself and his labourers," and the evident intention of the order was simply to restrain him from further felling and other interference with the forest or road. Mr. McIvor's idea that he is expected to forbid his labourers "to diverge from the path to obtain water, collect firewood, and other innocent purposes," is simply absurd.

9. The Government learn that the Forest Department cannot conveniently take charge of the avenue, and that as the trees have been burnt, others are not likely to spring up, if the opening be left to nature. Under these circumstances the Government resolve to cancel so much of their Order of the 28th September last, as transfers the avenue to the Forest Department. Mr. McIvor will accordingly resume charge of it, and will complete the formation of the road and keep it in repair, but he is distinctly to understand that not another tree is to be felled on any account. As Mr. McIvor assures the Government that Chinchonas will harmonize with the rest of the forest, he may plant these in the opening, but it would be well to do this in a less formal manner than as an avenue. This, as well as the introduction of other suitable trees is, however, left to his judgment.

10. The only point remaining to be noticed is the tone of Mr. McIvor's letter, and the position he therein assumes towards the Government.

11. The Government are well aware of the valuable services which Mr. McIvor has rendered the State in connection with the introduction of the Chinchona; they have repeatedly expressed their appreciation of his exertions, and they attribute the success of the experiment mainly to his skill. From first to last they have reposed entire confidence in him, and afforded him the fullest support. It is with much regret, therefore, that the Government feel compelled to record their serious dissatisfaction with the tone and tenor of the letter under consideration. A more improper letter in every sense could scarcely be addressed by a subordinate to his Government. Not content with bringing against the Chief Secretary unfounded charges of making exaggerated representations and being actuated by unworthy motives, Mr. McIvor accuses the Government of imposing on him restrictions, the severity of which is incomprehensible unless designed "to render their violation inevitable," and so subject him at any moment to dismissal "on a plea of disobedience of orders," or in other words, that this part of the Order of Government is simply a device to entrap him. Throughout the letter in fact Mr. McIvor assumes an attitude towards the Government wholly subversive of all subordination.

12. The Government cannot permit their subordinates to address them in this reprehensible manner, or thus to ignore their authority.

13. Mr. McIvor is under no obligation to continue in the service of Government, but officers who suddenly resign their appointments, endangering the interests entrusted to them, because they cannot have their own way in any particular matter, forfeit all claim to pension or gratuity.

14. Mr. McIvor will now be called upon to reconsider his letter of 11th ultimo, and to inform the Government whether he adheres to his wish to be relieved, and if so, from what date.

15. With regard to Mr. McIvor's second letter, the Government observe that their Order of the 2nd September last makes no allusion to watercourses at all. These involve no felling of the forest, and Mr. McIvor is quite at liberty to divert them when necessary as well as keep them in repair. As regards the use of the road, it has already been pointed out that the Order of Government was not intended to bear, and in fact does not bear

bear the construction put upon it by Mr. McIvor, the loss of labourers is consequently entirely due to his mis-interpretation of the order.

Ordered that the following telegram be despatched to Mr. McIvor:—

TELEGRAM.

“Your letter of 3d instant, No. 172. You may alter the watercourses and use the road freely, but there must be no more felling. The road and avenue, on this understanding, are replaced in your charge.”

Enclosure 16, in No. 33.

From Captain *R. H. Beddome*, Officiating Conservator of Forests, to *J. D. Sim*, Esq., Secretary to Government, Revenue Department, Fort St. George.

Sir,

Ootacamund, 15 October 1864.

I HAVE the honour to inform you that I have inspected the portion of the shola felled by Mr. McIvor near the Pykara Waterfalls, and alluded to in the General Order, No. 1794, of the 28th of September. As the shola has been burnt it will not now renew itself, but a dense thorny jungle (styled Kumri jungle) will rapidly spring up. Under these circumstances I would suggest that Mr. McIvor should now be allowed to plant it with chinchona, which is a fast growing and very handsome tree, or to avoid the sameness that a large mass of one particular sort of foliage would give to the scenery, a selection of various Australian acacias and eucalypti might be planted in connection with it, and perhaps a few of the easier growing jungle trees; the shola remaining under Mr. McIvor (who has an establishment on the spot) until the growth of the trees is fairly established. If the shola was now to be placed under the Forest Department we must send out an establishment and probably an overseer, and but them, and any attempt to plant only jungle trees, would I am afraid, be a failure, their growth is so very slow and uncertain, and as the clearing alluded to is very large they would probably die from exposure.

ORDER of the Madras Government, 14 November 1864.

THE road and avenue will be replaced under Mr. McIvor, but it must be distinctly understood that no further felling will on any account be allowed.

Enclosure 17, in No. 33.

From *W. G. McIvor*, Esq., Superintendent, Government Chinchona Plantation, to *J. D. Sim*, Esq., Secretary to Government, Revenue Department, Fort St. George.

Sir,

Ootacamund, 9 January 1865.

1. I HAVE the honour to acknowledge the receipt of the Order of Government, under date 8th November 1864, No. 2058A, and, with reference to paragraphs 11 and 12, beg to express my regret for any expression in my letter of the 11th October last, which may be considered insubordinate, and solicit the favour of being permitted to withdraw the same, and beg most respectfully to explain that in writing the letter above noted I had not the most remote intention of offering any insubordination, or placing myself in opposition to the Government authority, although at that time I felt I had been injured, and that representations had been made to Government, calculated to impede the development of this important undertaking, and to this impression only is to be attributed the tenour of my letter.

2. The Order of Government under reply effectually removes all misconception of their Order of 28th September last, tending to impede the progress of the Chinchona operations, and is thus highly gratifying to my feelings, although I am still unable to see the justice of Government ruling that I disobeyed their orders in felling the avenue in question. I am aware that I deviated from the plans proposed in my letter of the 7th January 1863, in as far as I converted the road into an avenue, but, at that time, I had not the experience of a wet season, and the consequent annoyance to our establishment from the leeches, which necessitated this alteration in my plans, in order to get rid of them; but this deviation, I respectfully submit, was no infringement of the Government Order, inasmuch as it did not interfere with the fringe on the banks of the river, or cause felling within sight of the Falls; had it done this, I would have submitted the deviation for the sanction of Government, as personally it was immaterial to me whether the avenue was formed or not.

3. I would respectfully bring to the notice of Government that, in carrying out an undertaking of this kind, when constant variations are necessary to meet circumstances and seasons, it may be shewn that any given Order of Government had been violated in the letter, although strictly carried out according to the spirit and intention; as an example,

the Government in their Order under reply sanction the alteration of the water-courses as may be necessary for the benefit of the plantation, stating at the same time that "not another tree is to be felled on any account;" yet the bringing of the water-courses necessarily involves the removal of the few trees that come directly in the way, and as the felling of these cannot be seen, or be productive of any injury, I would submit that the Order of Government sanctions the removal of trees to this extent only, this being subordinate to the benefit to be obtained from the water.

4. The avenue is being repitted and prepared for planting during the spring, and I feel confident that the Government need not be under any apprehension as to the scenery about the falls being in any way permanently injured, for although this may be a matter of opinion at the present moment, in two years hence, when our plants are grown up, the improvement will be such as will not admit of a difference of opinion.

5. With reference to paragraph 14, in which I am called upon to re-consider my letter, I have the honour to withdraw my resignation, as it would have been with the deepest regret that I detached myself from this interesting undertaking, in which I have laboured with all the zeal and ability I possess; as, in fact, it is the height of my ambition to bring it to a most successful issue, and especially as I distinctly see the means of attaining this, for not only can the plants be made to grow luxuriantly, but I am convinced that by a judicious system of cultivation, it is quite possible to increase the average per-centage yield of alkaloids in our Neilgherry barks by at least four or five time the average product of South American barks.

Enclosure 18, in No. 33.

ORDER of the Madras Government, 16 January 1865.

THE Government accept Mr. McIvor's apology, and withdrawal of his letter and resignation.

— No. 34. —

From Sir *Charles Wood* to the Government of Madras.

India Office, London, 15 April 1865.

Para 1. I HAVE considered in Council your letters in the Revenue Department,

* No. 19 of 1864, dated 23 July.

31	"	"	25 August.
33	"	"	13 September.
37	"	"	19 October.
43	"	"	25 November.
45	"	"	22 December.
1 of 1865	"	"	11 January.
3	"	"	23 January.

ment, noted in the margin,* reporting the progress of Chinchona cultivation on the Neilgherry Hills; and I am glad to find that the number of plants is steadily increasing, that their rate of growth is satisfactory, and that there is still a considerable demand for young plants among owners of land in the Hill districts.

2. In your Despatch, dated 11th January (No. 1), of 1865, you forward correspondence on the subject of a road which had been formed by Mr. McIvor, near the Pycara Falls. Your Excellency's minute fully explains the nature of the misunderstanding which appears to have arisen, and I therefore regret that the Order dated 28th September 1864 was issued.

3. This order has since been cancelled, and you have approved of the construction of a road to the plantation near the falls. I concur in the propriety of the censure which you have passed on Mr. McIvor's letter, dated the 11th of October. The tone of this letter was not becoming from a person in his situation; but I am very glad that the services of a public servant who has done such useful work, in an undertaking of much national importance, have been retained.

4. Your proposal to appoint a deputy superintendent under Mr. McIvor, with a salary of 360 *l.* a year, will receive further consideration; but, as at present advised, I am unable to see the necessity of such an appointment; while, in many respects, it would certainly be inconvenient.

5. In paragraph 3 of my Despatch, dated 16th January (No. 2), 1863, I desired that measures might be taken for obtaining an analysis of Chinchona leaves, and that a supply might be sent to some one of the Government hospitals

tals for trial. I shall be glad to learn what steps have been taken for obtaining information as to the efficacy of these leaves in cases of fever.

6. The monthly reports on the Chinchona plants have been regularly received at this office; but it is some time since the annual reports on the Chinchona plantations, which should be submitted by Mr. McIvor, have come to hand. I desire that Mr. McIvor's annual report for 1864 may be transmitted to this Office, and be made public in India for general information.

7. I shall shortly have occasion to address you on the subject of your Despatch dated 12th August (No. 80) 1863, in which a suggestion is made that a Government manufactory of quinine should eventually be established at Ootacamund.

— No. 35. —

From Sir *Charles Wood* to the Government of Madras.

28 February 1865.

1. I HEREWITH transmit 25 copies of a pamphlet on the cultivation of quinine in Java and British India, by Dr. de Vrij, which has been translated from the Dutch. Dr. de Vrij was officially connected with the Chinchona plantations in Java for several years, and he has since visited the Neilgherry Hills. His remarks on the comparative merits of the methods of Chinchona cultivation, adopted respectively on the Neilgherry Hills and in Java are, therefore, of great value.

2. Copies of the pamphlet should be supplied to Mr. McIvor, and to others who may be interested in the cultivation of Chinchona plants in your Presidency

— No. 36. —

CULTIVATION OF QUININE in *Java* and *British India*, by Dr. *J. E. de Vrij*, late Superintendent of Chemical Researches in Netherlands India.

NOTICE.

Dr. DE VRÏ, the author of the following pamphlet on "The Cultivation of Quinine in Java and British India," was connected with the Chinchona plantations in Java for several years, as inspector commissioned to conduct the chemical researches. He afterwards visited the Neilgherry Hills; and his testimony to the superiority of the method of Chinchona cultivation adopted by Mr. McIvor over that which was pursued by Dr. Junghuhn in Java is of the highest importance. Dr. de Vrij has also made a very satisfactory analysis of Chinchona bark grown on the Neilgherry Hills.

Dr. Junghuhn, the talented and energetic superintendent of Chinchona plantations in Java, died in 1864.

Clements R. Markham.

London, February 1865.

ON THE CULTIVATION OF QUININE IN JAVA AND BRITISH INDIA.

MUCH has been already written with regard to the cultivation of quinine in Java. I do not now pretend to treat the subject in any novel point of view, but simply, and in a popular form, to make an enlightened public more generally acquainted with the mode of cultivating quinine, and in so doing I shall, as far as possible, avoid everything of a personal nature which may be deemed derogatory to a subject of such general interest.

The original nursery of the trees which produce so indispensable a medicine for the protection of the lives of Europeans residing in the tropics, is the tropical portion of South America, where, at various heights above the level of the sea, they

they grow in the primitive forests of the contiguous republics of Venezuela, New Granada, the Equator, Peru, and Bolivia. It appears that the medicinal properties of the bark of these trees have from time immemorial been known to the natives of those countries, but it was not before the year 1632 that its curative powers were recognised in Europe, and then only in a limited sphere. Subsequently, however, and more especially after the Countess de Chinchon, the wife of the Viceroy of Peru, had been cured of fever by making use of quinine, the bark in question became duly appreciated in a much wider circle.

The species of plants to which the quinine trees appertain was called by Linnaeus the *Chinchona*, in honour of the above-named lady. The barks, which subsequently to the discovery of their medicinal qualities were introduced into Europe, and which are derived from various species of the above-mentioned genus of plants, were soon contra-distinguished one from the other, so far as their curative effects, and consequently their intrinsic value, were concerned. Such was more particularly the case in 1820, when the proper anti-febrile components of the quinine barks were analysed by Messrs. Pelletier and Caventou, who gave those components the names respectively of quinine and chinchonine. On examining, however, a certain quantity of those two components, which M. Pelletier had prepared with his own hands and sent to me, I found that they were not perfectly pure, as they presented traces of two other substances now known as quinidine and chinchonidine.

In consequence of the noble discovery of Pelletier and Caventou, we now know that the febrifugal power of the quinine bark arises from four substances, the so-called quinine alkaloids, which greatly resemble one another, and which are called quinine, chinchonine, quinidine, and chinchonidine. Of these four the quinine is by far the most powerful, and that is the reason this alkaloid has, since its discovery, been almost exclusively employed by medical men in cases of fever. This is to be regretted in a certain point of view, for although it would be unpardonable to replace in serious cases of illness the powerful quinine by a less potent substance, it is certainly a pity that the latter should be almost wholly unappreciated and unemployed, thereby unnecessarily raising the price of quinine. It is a fact that there is no particular quinine bark yielding exclusively quinine, for even the species which is the richest in that alkaloid always contains a certain quantity of one or more of the three other constituents. In fact it happens that there are many barks which are wholly devoid of quinine, but which contain chinchonine, quinidine, or chinchonidine. The too exclusive use of quinine as a curative has for result that the chinchonine, and other alkaloids, obtained from the quinine barks, simultaneously with the quinine, in preparing it for manufacture, are almost unsaleable, so that the price of the raw material, and the cost of preparation, press entirely on the quinine, which is thus rendered unnecessarily dearer. This, however, should not be the case, inasmuch as the concomitant substances, such as chinchonine, &c., can be also used for dispelling fever. That those substances can be successfully employed has been proved by many skilful physicians, for example, by my friend Dr. Rombach, of Hellevoetsluis; and I myself, during nearly a six years' residence in Java, have always beneficially made use of quinidine for fever patients among my servants, without once being under the necessity of having recourse to the more expensive quinine. Although, for my own part, I am thoroughly convinced that all the above-mentioned for febrifugal components of the quinine barks may be advantageously employed, it is nevertheless certain that so long as that conviction does not become a general one, the quinine alone will have any real value, and, consequently, those barks which are the most productive of it will have the greatest commercial worth. Amongst the known barks, the Calisaya, which is indigenous to Bolivia, is the richest in quinine, and on that account it is the most in request for quinine manufacturers; the result is that the price of Calisaya quinine is becoming higher and higher every day, and it has therefore become necessary to employ other kinds of barks for obtaining a supply of quinine.

The constantly increasing use of quinine bark has given rise to the apprehension that the trees will gradually decrease in number in their original countries, and possibly become at last extinct. This fear was originated by the reckless manner in which the quinine trees in America were stripped of their bark in order to collect it in large quantities, and by the neglect in taking any steps to replace the felled trees by others. Extreme opinions are expressed with regard to this apprehension, but, as is generally the case, the truth lies in the mean,

mean. It appeared to me, after having made an express journey to London, that there was no ground for apprehending a scarcity of quinine bark in general, but only of such barks as contain quinine, so that I am convinced that the suggestion made years ago by Junghuhn, Royle, Blume, and others, namely, to introduce the quinine plant into the East Indies, is well deserving of being carried out.

The introduction of the quinine trees into the East Indies was at last effected under the government of our revered King William III., in the year 1852, when the first real quinine plant, and precisely the species which was the best adapted for quinine preparation, namely, the *Calisaya*, was brought to Batavia in the month of April on board the merchant ship "Prince Frederick of the Netherlands," Captain P. Huidekoper, and immediately afterwards set in the strawberry grounds of the Governor General at Tjibodas, on the slope of the Gedeh Mountain. The plant in question was obtained from Messrs. Thibaut and Keteleer, of Paris, who, through Professor de Vriese (acting under instructions from the Government), exchanged it for an assortment of Java plants. This plant died some time after, but not before Mr. Teijsmann, the superintendent of the plantation at Buitenzorg, had procured two slips from it, which slips by the year 1862 had grown up to trees 20 feet high.

Had it been known in 1852 with what facility and how quickly the quinine plant might have been multiplied by means of slips and "eyes"—and that facility was proved beyond a doubt by the skilful Mr. McIvor, the manager of the English quinine plantation at Ootacamund—the single *Calisaya* of Tjibodas would by this time have had millions of descendants, and thus the cultivation of the species, which has been found most suitable for quinine preparation, would have been placed on a permanently secure basis. Independently, however, of the want of experience in that year, it would have been too hazardous to rely on a single plant for the development of the newly introduced cultivation and thus the mission of Mr. Hasskarl to Peru was in every respect a desideratum. By his Majesty's Decree of the 30th of June 1852, the then Minister of the Colonies, Mr. Chas. F. Pahud, was authorised to engage Mr. Hasskarl to make a collection, of quinine plants and seeds, and the latter accordingly left Southampton for America on the 17th of December of that year; by the 28th of the following July he had forwarded to the Netherlands a good quantity of seeds, of various species of quinine trees, and those seeds were in part sent by the minister to Java, and partly distributed amongst the three academical gardens and the one at Amsterdam, in order to be carefully attended to.

The seeds which remained in the Netherlands soon shot up, but scarcely had the plants been further developed when the report spread that they did not belong to a good species of quinine trees. Abiding, however, by my resolution to avoid all personalities, I shall pass over in silence all that was said and written on that score, but I may be allowed to state that accidental circumstances afforded me the opportunity of hearing a competent authority declare that the greater portion of the seeds employed at Leyden had produced plants of the genuine *Calisaya* genus, and consequently the species most suitable for the preparation of quinine. In fact, I received a visit from the celebrated botanist, Dr. Weddell, so well known by his journeys through the quinine districts of South America, and at the request of the minister I accompanied the doctor to Leyden on the 24th September 1855, in order to show him the young quinine plants there, and to elicit his opinion respecting them. As soon as he saw them he declared that the greater number were of the true *Calisaya* quinine species, whilst he refrained from expressing any positive decision with regard to the remainder, as the species to which they belonged was not, he said, exactly known to him. Although the latter plants were labelled *Chinchona ovata*, it subsequently turned out that Dr. Weddell had acted wisely in not forming a positive opinion respecting them, inasmuch as, after undergoing many changes of name, they were at last described as a new species, and thenceforth called *Chinchona Pahudiana*. The quinine plants obtained in the Netherlands from the seeds in question were forwarded in various vessels to Java as opportunities presented themselves, amongst others a considerable number in September 1855, accompanied by Mr. Junghuhn himself.

The seeds which had been sent to Java in November 1853, were sown at Tjibodas by Mr. Teijsmann, with the assistance of the superintendent, Mr. Teuscher. Although I do not know the exact number of those seeds, it appears

by an official report that it must have been considerable, as they filled 11 beds 40 feet in length and 4 in breadth. Whether that mode of treating the seeds was an exactly advantageous one, or whether the seeds themselves during the voyage from Holland to Java had lost a portion of their sprouting power, I cannot take on myself to decide, but it is so far certain that the quantity of quinine plants which were obtained from them was very small, and out of all proportion with the number of seeds which had been sown.

Whilst this was occurring in Holland and in Java with respect to the seeds which Mr. Hasskarl had forwarded from Peru, he himself landed in Batavia on the 13th of December 1854, with 21 chests of quinine plants, and he was entrusted by the Government with the management of the quinine cultivation. In this post, however, he did not long continue, for having fallen ill he was obliged to ask leave of absence, and he returned to Europe in the second half of the year 1856. The late Mr. F. W. Junghuhn, the inspector, who had been commissioned to carry on investigations with respect to natural history in the Dutch Indies, was appointed by the Governor General to the vacant place, at first temporarily, but afterwards permanently.

It appears by official reports, published on the 20th of July 1856, that, on the arrival of Mr. F. W. Junghuhn, the number of living quinine plants in Java did not exceed 251, and although there were also some 1,650 slips in the ground, the majority had not taken root. Taking this fact in connection with the large quantity of seeds sown, and the 24 chests of live quinine plants brought by Mr. Hasskarl, one would certainly consider the result here given as unfavourable, and imbibe the impression that at the commencement there must have been many adverse circumstances militating against the young plants, although the nature of those obstacles is not, so far as I can see, clearly explained in the reports of that time. The 251 quinine plants in existence on the 20th July 1856, were distributed between the plantation at Tjibodas, on the Gedeh Mountain, and the Tjiniroean plantation on the Malabar. Those plants consisted of 99 *Chinchonæ Calisayæ*, 140 *Chinchonæ Pahudianæ*, 7 *Chinchonæ lanceolatae*, 1 *Chinchona succirubra*, 3 *Chinchonæ lancifoliae*, and 1 *Chinchona pubescens*.

Shortly after Mr. Junghuhn had thus undertaken the management of the quinine cultivation, it appeared to him that for the most part the plants at Tjibodas were in a pining condition, and in fact some of them died. These lamentable circumstances he attributed to two causes; first, to planting them in places where they were fully exposed to the sun without any shade whatever; and, secondly, to the unfavourable nature of the ground, composed of an impenetrable bed of *tjadas* (a Javanese word), scarcely covered by a thin layer of mould. With regard to the former cause, I am convinced, now that I have seen the quinine cultivation in the Neilgherries, that no importance need be attached to it, inasmuch as the quinine plants, when once they have well taken root, grow up at a suitable height above the level of the sea, although openly exposed to the sun's rays. The latter cause, however, is a well-founded one, as I myself became convinced after several quinine trees had decayed on the plantation at Tjibodas, and after they had been taken up in my presence; moreover, the spots where the trees stood were enclosed with palings, at my own charge and in my presence, in order that anyone, so disposed, might ascertain the real facts of the case with reference to this disputed point. In the interest of the history of the affair I have preserved some portions of the roots of the quinine trees which I had thus caused to be dug up, and every one can see by the volcanic nature of the mould still adhering in a dried state to those pieces, that the ground was unfit for the plants, which had pined away. As the site of the plantations at Tjibodas was so unfavourable, Mr. Junghuhn was induced to suggest to the Governor General the advisableness of transferring them to the neighbouring wood on the declivity of the Gedeh Mountains. This suggestion was approved of, and the transplanting was accordingly effected; but though this transplanting from the unsuitable site at Tjibodas was justified under all the circumstances, such was not, in my opinion, the case with regard to the transfer of the quinine trees from Tjiniroean to the Malabar plantation in the primitive wood on that mountain, as the Tjiniroean site was, as Mr. Junghuhn himself declared, a really excellent one. The reason for this transplanting was that Mr. Hasskarl, in laying down the plantation, had the forest trees removed and replaced by "dadap" trees (*Erythrina Indica*), which afforded a far less deep shade than the former ones. Mr. Junghuhn, in fact, started from the principle that, inasmuch as the quinine trees

trees in their primitive countries grew in thick woods, and consequently in deep shade, those trees which had been brought to Java should be placed in analogous situations, and on that principle he worked from the time he assumed the management of the quinine cultivation until the commencement of the year 1864. Whether such a basis of operations is the best for obtaining a speedy and large supply of quinine bark will be seen in the sequel, by comparing it with the method pursued by the English.

As it was of the highest importance to increase the small number of plants, Mr. Junghuhn established nurseries in Tjineroean for the purpose of tending the slips. By these means the number of plants was certainly augmented, but not in the proportion they might have been if Mr. Junghuhn had also applied to that subject his remarkable attainments in natural history. The slips which had been destined for the propagation of the species were described by himself as "twigs cut close under the leaf-knob, which should not be of greater length than, as a maximum, half a foot," and he very justly remarks that such slips produced plants which could not withstand any baneful external influences. It is a pity that after so well-founded an observation he did not proceed to discover the cause of such a fact by making certain experiments, for had he but done so he would certainly have ascertained, as Mr. McIvor did, that his slips were too large, and that the increase of quinine plants can be, *par excellence*, effected by means of slips, provided the latter are taken as small as possible.

Thus, whilst Mr. Junghuhn, by neglecting to interrogate Nature in a proper manner, arrived at the conclusion that it would be more advisable to have recourse to seeds instead of plants for the purpose of increasing the number of quinine trees, Mr. McIvor, by dint of judicious experiments, formed quite a contrary opinion, consequently giving the preference to slips over seeds.

Although Mr. Junghuhn, for the reasons just stated, was not so successful as he might have been in the development of the quinine cultivation by means of slips, nevertheless the number of plants in Java was augmented by his exertions, and the result was that he was enabled to give a greater extension to his plantations; accordingly he successively established several on the Malabar mountain, and they are now officially registered under the names of the Pahud Plantation, the Gedong-badak Plantation, &c.

The development of the quinine cultivation in Java would have only slowly progressed had not some of the trees which had been planted at Tjibodas begun to blossom forth in the month of June 1857, thereby affording the prospect, so much desired by Mr. Junghuhn, of a welcome supply of seeds. It is true that the first flowers disappointed that hope, as they withered away, but soon afterwards other blossoms made their appearance, and finally, the first ripe seeds were obtained in June 1858.

The species which furnished those seeds was introduced into Java under the name of the *Chinchona ovata*, but it subsequently obtained the name of *Chinchona Condaminea*, the reason for such a change being that it is impossible, with respect to many kinds of quinine trees, to determine the exact species before the trees bear flowers and fruit. Thus, so soon as the doubtful *Chinchona* blossomed and yielded fruit, it furnished Mr. Junghuhn with the necessary data for forming an opinion on the subject, and after due examination he came to the conclusion that this particular *Chinchona* was either a *Lucumæfolia* species, or a new one.* In order to remove all doubt on the subject, I obtained the consent of the Governor General to send a flowering branch with fruit to my friend Mr. Howard, the quinologist, in London, who by his purchase of the herbarium of Ruiz and Pavon, was in the best position to settle the question; and that gentleman, after duly examining the specimen forwarded to him, declared that it was not the *Chinchona Caravayensis*, as was thought by some persons in Holland, but a hitherto unknown species, to which he gave the name of *Chinchona Pahudiana*.†

The species, since then known under the above name in the official registers

continued

*The cause of this doubt on the part of Mr. Junghuhn,—a doubt which has given rise to some unjust strictures—in this regard, may be attributed to the brevity of Dr. Weddell's description of the *C. lucumæfolia*; for example, it is not stated in that description whether its leaves are fibrous or not.

† According to Dr. Weddell, the *Chinchona Caravayensis* attains, in its native land, to no greater height than three metres (about nine feet), while a specimen of the *Chinchona Pahudiana* on the slope of Mount Gede was, at the end of the month of December 1863, 34 Paris feet in height (a Parisian foot = 13·124 English inches.) It is, therefore, of importance to note the difference in nomenclature, as the bark of the *Chinchona Caravayensis* does not possess any value.

continued from 1858 till 1863, when I last saw it, to furnish flowers and fruit, so that millions of seeds have been procured from it. It is true that some of the Calisaya trees in the plantation at Tjibodas also yielded flowers and fruit, but they died before all the seeds had arrived at maturity, in fact, Mr. Junghuhn obtained for available purposes millions of ripe seeds from the *Chinchona Pahudiana*, and only a thousand seeds from the *Chinchona Calisaya*.

Taking into consideration what I have already said with regard to the less successful results of re-production by planting slips, one will easily discover the reason why the increase of the Calisaya quinine bears so unfavourable a comparison with that of the *Chinchona Pahudiana*, during Mr. Junghuhn's management of the quinine cultivation in Java. He was, however, sufficiently convinced of the great value of the Calisaya quinine to bestow, as he did, every care on its cultivation, and thus his afore-mentioned incorrect opinion respecting the increase of plants by slips or seeds, when that opinion came to be compared with the positive fact that the *Chinchona Pahudiana* had furnished an innumerable quantity of ripe and suitable seeds, was the sole cause of the extensive development which he gave to this last-named species.

There has been so much said and written with reference to this extensive development that I have deemed it advisable to take up that subject, as I am convinced that the mode of treatment adopted by Mr. Junghuhn to that effect has given rise to very unjust opinions. The objection was, that the bark of the *Chinchona Pahudiana* was of little or no value, and, in fact, some persons went even so far as to openly assert that this species of quinine tree was no better than firewood.

But whilst it would be going to the extreme to pronounce such an opinion with regard to that species of quinine tree, it cannot, on the other hand, be denied that Mr. Junghuhn indulged in too sanguine expectations as to its future productiveness, so that here also, as in the majority of cases, the truth lies again in the mean.

Before, however, proceeding to offer any opinion on such a contested point, it is requisite for us to have a clear idea of the real object of the cultivation of quinine in Java. Should the opinion prevail—and my impression is that such an opinion would be a one-sided one—that only those trees should be propagated which deliver the best bark for the preparation of quinine, it would be, without doubt, merely necessary to cultivate the Calisaya species, and thus leave to their fate all the other kinds at present existing in Java; but it must be remembered that although the quinine bark is certainly for the most part employed in making quinine preparations, it is also used in no inconsiderable quantities by medical men for decoctions, extracts, &c., &c.; and not only in my opinion, but also in that of the well-known chemist, M. Guibourt, the bark of the *Chinchona Pahudiana* is in all probability quite suitable for the latter purposes. It will be readily concluded, therefore, that whilst the Calisaya should be the most extensively cultivated, the *Chinchona Pahudiana* and other species of quinine trees, should not be altogether lost sight of.

Other arguments might be adduced against the exclusive cultivation of the Calisaya species, amongst others that we do not yet know, for a certainty, what species are the most suitable for acclimatization in Java, so as to produce the most advantageous results.* The advantage, however, does not alone consist in the quantity of quinine which the bark of any particular species may possess, but also in the quantity of bark itself which may be supplied by any tree in a given time. For example, it is within the range of possibility that a species, with a bark less productive *per se* of quinine than that of the Calisaya, may be even more advantageously cultivated than the latter, in the event of there being a much greater quantity of bark on the one than on the other during the given time, so that in the end the relative lesser quantity of quinine substances is amply made up in another way.

The inference from the foregoing remarks is, that the blame thrown on Mr. Junghuhn,

* Moreover it is not yet an established fact that the Calisaya trees cultivated in Java are so well adapted for quinine preparation as those which have been introduced from Bolivia, for it appears by chemical analysis that some of the Calisaya barks of that island contain a somewhat larger quantity of quinidine, and, in fact, I found on one occasion nearly 3 per cent. quinidine in a bark of that kind. It is true that it was only in some cases I discovered so large a quantity of that substance, but so long as we are unacquainted with the circumstances on which the formation of quinine or quinidine depends, it would be highly imprudent to rely on any particular sort for the prosperity of the quinine cultivation.

Junghuhn, with respect to the cultivation of the *Chinchona Pahudiana*, is for the most part undeserved, when it is considered that he was only then making experiments in cultivation, for such was the real state of the case during his management, and the only objection that can be reasonably urged against him is that the number of plants which he reared of the *Chinchona Pahudiana* species was too great in proportion to that of the *Calisaya*.

After this unavoidable digression, I now resume the description of the extension of quinine cultivation under Mr. Junghuhn's management. As soon as he had obtained a quantity of suitable seed, he successively laid down new nurseries, with all that energy peculiar to him, formed sprouting beds in hitherto all but impassable forests, the haunts of rhinoceroses and wild bulls, and ran good waggon roads through the forests themselves, thus opening them out as thoroughfares. Whilst the cultivation in question was thus gradually spreading in west Java, matters were on a different footing in the eastern portion of the island, for there was only one small experimental plantation in Bezoeki, on the Ayangge mountain, with 21 plants set in 1857, and this number was diminished to 18 by the end of December of that year. This plantation was formed by Mr. Junghuhn with the laudable object of making an experiment with regard to the influence which the drier climate of east Java might exercise on the development of the quinine plant, and it is therefore to be deeply regretted that he never afterwards visited that plantation, nor acceded to my repeated offer to go and make the, in my opinion, highly necessary examination. The consequence is that, up to the present time, we are totally ignorant as to whether the drier atmosphere of the Ayangge mountain influences beneficially or otherwise the growth and quinine produce of the trees on that site. Before, however, taking any further steps to extend the quinine cultivation in west Java, it is in my opinion absolutely necessary to procure the still unsupplied data regarding the condition of the above-mentioned plantation on the Ayangge, for Mr. McIvor's experience at Ootacamund teaches us that, although extremes of draught or moisture are always prejudicial, nevertheless the quinine trees suffer less from the effects of the former than of the latter, so that it is quite possible, in fact probable, that the drier climate of east Java is more suitable for the cultivation of those trees than the relatively moist one of the west.

Mr. Junghuhn undertook the management of the cultivation in July 1856, and at that time there were 251 live plants, and 1,650 slips, most of which had not taken root; but at the end of December 1863, we had 1,151,810 quinine plants, of which 539,030 were growing in the open air, and 612,771 in the sprouting beds and nursery depôts, together with 6,830 live slips. These plants consisted of—

12,093	Chinchonæ	Calisayæ,
251	„	lancifoliæ,
89	„	succirubræ,
128	„	lanceolatae,
1	„	micanthræ,
1,139,248	„	Pahudianæ,

which were found distributed amongst the following plantations :—

1st. Nagrak, on the Tankoeban-prahoe, 5,000 feet above the level of the sea. 2d. Tjineroean, 4,820 ditto. 3d. Tjibeurum, 4,800 ditto (the two latter plantations situate on the Great Malabar). 4th. Tji-bitoeng, 4,700 ditto, on the Goenong Wajang. 5th. Reong-goenong, 5,000 ditto. 6th. Kawah-tjiwidei, 6,000 ditto. 7th. Rantja-bolang, 5,900 ditto (the last three situate on the Kendengge mountain, between the Goenong Tiloe and the Goenong Patoea). 8th. Telaga Patengan, 4,850 ditto. 9th. Tjibodas, on the Goenong Gedeh, 4,440 ditto; and, finally, 10th. The Wonodjampi plantation, on the Ayangge mountain, 6,830 ditto.* The heights above the level of the sea refer to the inspector's dwellings, the first eight of which were erected during Mr. Junghuhn's management, and they are now occupied by permanently appointed inspectors. The residence at Tjibodas was constructed previously to the year 1856, and the last-named plantation (the 10th) has no inspector's house, but is entirely left unattended to, so that the height above mentioned, of No. 10, refers to that plantation itself. The inspectors thus charged with the superintendence of the plantations are generally non-commissioned

* I afterwards learned that subsequently to my departure from Java 16 more quinine plants were planted on the Diëng, so the number of plantations, large and small, had attained the number of 11, on 11th December 1863.

non-commissioned officers on leave of absence, enjoying a salary of 75, 100, or 125 florins per month; and the work on the plantations is carried on by natives of the country, who are paid a certain fixed sum per month, in order to secure their permanent services, and a certain other sum for labour performed, besides having lodgings rent free.

If we confine ourselves to a mere consideration of the increase in the number of quinine trees which, as we have already seen, has risen to 1,151,810, we shall certainly feel bound to declare that the result thus obtained is a favourable one; but that impression will be weakened when we come to compare the various species which compose that number, for we cannot but be struck by the proportion the *Chinchona Calisaya* bear to the *Chinchona Pahudiana*, viz., 12,093 of the former, to 1,119,248 of the latter. For although, as before observed, I do not in any way share the unfavourable opinion entertained with respect to the value of the bark of the latter quinine species, and even, as the result of my own experiments hold to the probability that, when otherwise cultivated, that species will furnish a very useful bark, nevertheless I consider it as an established fact that its bark, as hitherto brought under notice, is far inferior to that of the *Calisaya*, so that the last-named species should be the one most extensively cultivated. Whilst thus regretting that the proportion referred to is just the reverse of what, in my opinion, it should be, I am consoled by the reflection that such a fault may be easily repaired by applying to the 12,093 *Chinchona Calisaya* the mode of cultivation so successfully adopted by Mr. McIvor, for by so doing that number may be increased to at least two millions in less than two years. Had the parties whose province it was to give advice in this country to the successive ministers of the colonies, with reference to the quinine cultivation, impressed on the minds of the members of the Government the fact that the insufficient development of that cultivation was attributable to the non-extension of the *Calisaya* species by means of slips, and had they pointed out the means of remedying the defect, they would have better furthered the public interests, than by making such a useful object as the introduction of quinine trees into Java, the medium of giving vent to personal animosity, as unfortunately was the case.

It is true that a doubt has been raised as to whether the introduction of quinine cultivation into Java was, in reality, a useful undertaking. I cannot better remove such a doubt than by pointing to the fact that the English, a decidedly practical people, soon followed the example given by Holland, by cultivating quinine trees in British India; and here it may be remarked, as deserving special consideration, that in that portion of the Indies the Government is not in the position of a planter, and that it is only by way of exception that the cultivation in question has become a Government affair. The reports on the subject, which form not less than 272 folio pages of a Blue Book, published on the 20th of March 1863, by order of the British Parliament, were obligingly sent to me, together with the official reports from British India, thereby enabling me to give complete information regarding the English cultivation of quinine, information which is assuredly of much importance for Java. The information thus derived I now communicate all the more eagerly that, after having been in close connection with the quinine cultivation in Java for a period of five years, I made myself personally acquainted with the mode pursued in Ceylon and the Neilgherries, and thereby arrived at the conclusion that that mode was by far preferable to the system followed in Java, so long as I was residing there.

After the failure of the first attempt, in the year 1855, to introduce the quinine plant into British India, the three *Calisaya* plants at Darjeeling having died in a short space of time, Lord Stanley, the English Secretary of State for India, resolved, in the month of June, 1859, to send Mr. Clements Markham on a mission to South America, in order to make a collection of quinine plants and seeds, and although the plants which that gentleman brought from those parts assumed (through the effects of heat whilst traversing the Red Sea) so bad a condition on his arrival at Ootacamund, that they shortly afterwards withered away, he had during his stay in America taken such judicious and appropriate steps for securing the further transmission of a good quality of quinine seeds and plants, that his mission can only be regarded as an eminently successful one, as clearly proved by the decidedly happy results of the introduction, by means of those seeds and plants, of quinine cultivation in three separate districts of the wide-spread Anglo-Indian possessions, namely at Darjeeling, at the foot of the Himalaya; at Hakgalle, near Newera Ellia, in Ceylon; and at Ootacamund in the Neilgherries, in the Madras Presidency.

The Chinchona plantation at Darjeeling is placed under the management of Dr. Anderson, the director of the Botanical Garden at Calcutta, who was sent in 1861 by the Governor General, Lord Canning, to Java, in order to take charge of the quinine plants, which our Government had readily promised to give him. The plants thus liberally presented by the Hollando-Indian Government form the heart of the above-mentioned plantation, which was laid down towards the end of the year 1861, and which, after having overcome many obstacles, contained 19,516 plants on the 15th of July 1864.

The Hakgalle Chinchona plantation in Ceylon, 5,200 feet above the level of the sea, is under the immediate management of Mr. MacNicoll, and superintendence in chief of Mr. G. H. K. Thwaites, the well-known botanist, and director of the Botanical Gardens at Peradenia. This plantation was formed in the beginning of the year 1861, and at the end of August 1863, contained 22,050 quinine plants.

The Chinchona plantation at Ootacamund, 7,500 feet above the level of the sea, as well as the branch one at Neddiwuttum, also in the Neilgherries, is placed under the management of the skilful and eminently practical Mr. McIvor; and should the cultivation in British India lead to good results, as no doubt will be the case, they will be mainly due to his intelligent investigations. The results, in fact, obtained in this plantation, are of such a nature as to warrant me in bestowing marked attention on it, the more so that in the month of November 1863, I thoroughly examined it during a fortnight, and thus personally became convinced of the reality of the facts communicated to me by Mr. McIvor. The first quinine seeds sprouted at Ootacamund in March 1861, and thus produced 172 young plants at the end of that month; on the 9th of the following month he received the first young healthy quinine plants to the number of 463, so that he was then in possession of 635 such plants, nearly all belonging to the *Chinchona succirubra* species, whence the red quinine bark is obtained. By the 30th of April 1861, the above-mentioned number of plants had been increased, by means of slips and "eyes," to 1,128; in the corresponding months of the two following years to respectively 31,495 and 157,704, and on the 31st of December 1863, to 277,083.

It will be seen, by the foregoing details, that the number of original quinine plants which were set at Ootacamund on the 9th of April 1861, had, by the end of December 1863, consequently within three years, increased to the surprising number of 277,083, without the importation of seeds or any new plants.

This rapid propagation of the quinine plant by means of suitable slips has been further illustrated by the following fact:—The celebrated quinologist, Mr. J. E. Howard, of London, presented to the English Government a single plant of the *Chinchona Uritsinga*, five feet high, and this tree was brought to Ootacamund on the 18th of April 1862 in a sickly condition, but having, on the 31st of May, began to recover, some slips were taken from it, and by the end of December 1863, consequently within 19 months, not less than 6,350 young plants were obtained from this single one. Now if we compare that fact with the other one, that the single plant of *Chinchona succirubra*, which Mr. Junghuhn found in Java when he first undertook the management of the quinine cultivation, in July 1856, had only produced 89 young plants by the end of December 1863, consequently, in about seven years' time we shall certainly, without any difficulty, come to the conclusion that the observations I have already made, respecting the slips planted by Mr. Junghuhn, are not only well founded, but that, in point of fact, the weak point of the mode of Java cultivation is demonstrated therein. If the method so successfully followed by Mr. McIvor for propagating the trees had been pursued with regard to the 99 Calisaya plants existing in Java in July 1856, the number of trees of that species, which, as before observed, supplies the bark most suitable for quinine preparations, would in eight years' time have amounted, according to the standard above given, to several millions, and thus the unfortunate contest respecting the *Chinchona Paludiana* would never have arisen.

Whilst Mr. Junghuhn planted the quinine trees in the thick shade of the primitive forests, because similar trees grow in analogous situations in the countries where they are indigenous, Mr. McIvor adopted a totally different plan. When the latter received the first quinine seeds, which were those of a species wholly unknown to him, he made himself well acquainted, it is true, with all the circumstances connected with the growth of the plants in their native countries, and fortunately for him Mr. Markham happened to be at Ootacamund

at the time, and rendered him no little service with regard to the requisite information; but Mr. McIvor also asked himself the question—in what way the quinine plants should be cultivated with the view of producing, in the shortest possible time, the largest possible quantity of bark with the greatest possible amount of quinine?

Such a question can only be answered by a series of well-regulated experiments, and although Mr. McIvor himself would be the first to acknowledge that the question he himself proposed is still far from being completely solved, it is nevertheless certain that his investigations have already led to results which are assuredly deserving of being made generally known.

In consequence of a variety of experiments made by him with the seeds he had received, he discovered a way to make them sprout forth within, on an average, 14 days. Whilst at Java a bamboo pot was employed for the sprouting of each little seed; and during the latter part of my stay in that country the parties concerned only ventured so far as to place two such seeds in one pot; the mode adopted in Ootacamund (as well as in point of fact in Holland by skilful rearers of the plants in question) was to set 30 or even more seeds in one small flower pot, whereby much money and space were economized, not to make mention of the greater facility with which their growth could be attended to.

After thus ascertaining the mode of treating the quinine seeds, with the object of producing sound plants in a short space of time, the second question that arose was: in what manner the plants themselves should be cultivated in order to attain the desired end? Although, in consequence of the mode of planting in Java, namely, in the thick shade of the forests, a certain pressure was brought to bear on Mr. McIvor, he was firm enough not to abandon, but on the contrary to adhere more closely to the conviction, based on his practical experiments, that the quinine trees, according to their species, should be cultivated more or less in the open sun, at suitable heights, however, above the level of the sea, and this opinion he urged on the attention of the Governor of Madras, Sir William Denison, who was naturally enough reluctant to give his consent to the felling of trees in the already sparsely wooded Neilgherries. This high functionary, however, having full confidence in the skill and experience of Mr. McIvor, duly examined the arguments the latter gentleman adduced, and finally allowed the woods to be cleared on such sites as were deemed suitable for the cultivation in question; and at the same time Sir William entrusted the entire management of the quinine plantations in the district to Mr. McIvor, who accordingly carried out his own suggestions as already set forth.

Thus the rearing of quinine trees in the East Indies is at this moment conducted on two systems which I can best explain by comparing it with the process of raising oak trees and field timber. According to one of those systems, which, as already stated, is followed in Java, the plants, which of course must be set at a great distance one from the other, should, like oaks, grow up to high trees, and should not be cut down before the lapse of several years, for the purpose of obtaining the quinine bark; according to the other system, the one in vogue, not only in the Neilgherries, but also, although not in so consistent a manner, in Ceylon, the object is not so much to raise quinine trees as plants, which, exactly like field timber, supply a regulated quantity of bark, and are planted at a much less distance from each other.

Thus, for example, the quinine plants in the Neddiwuttum plantation, which has been laid down for 900,000 plants, and which is situate about 16 English miles from Ootacamund, are set six English feet from each other, so that they may afford reciprocal protection against the high winds which often prevail there; and, whenever a plant is sufficiently developed, the mode adopted is to cut the next one at the root, so that the number of trees in the plantation is reduced by one-half.

The plants thus cut continue to supply bark so long as their roots sprout up anew and produce plants. So soon as these new plants attain a certain growth the older ones are cut in like manner, and thus a regular quantity of quinine bark is procured. Besides this mode of securing a regular supply, another one is adopted, namely, to cut off a branch yearly from each plant, and to convert the bark on that branch into an article of commerce. The question as to which of these two systems leads to the more practical results can only, of course, be determined by experience; but one thing is already certain, viz., that I have in my possession a written statement by Mr. McIvor, to the effect

effect that before the end of December 1865 he will be able to forward to Europe between 3,000 and 5,000 English pounds weight of quinine bark, the yield of 16,000 plants set at Neddiwuttum in the months of September, October, and November, 1862. Judging by what I saw at Neddiwuttum, Ootacamund, and other parts, I do not for a moment doubt but that he will be able to keep his word; and now the only question remaining to be solved is, whether Mr. McIvor's plan for rearing quinine trees is the one most likely to produce bark containing a sufficient quantity of quinine?

As Sir William Denison was very kindly pleased to give orders by telegraph to let me have whatever I required for attaining the scientific object I had in view, I was supplied, at my request, with specimens of the various kinds of bark furnished by the Neddiwuttum and other plantations, and was thereby enabled to give an answer, on my return to Holland, to the last-mentioned question. The result of the chemical analysis of those barks, which was made by me as well as by Mr. Howard, and which I have elsewhere communicated,* was that their quinine component was perfectly satisfactory, and thus the opinion expressed by Mr. Junghuhn to the effect that the trees grown on sites fully exposed to the sun would contain too little of that component, appears to be a totally erroneous one, as indeed I suspected would turn out to be the case, judging by certain facts which had come to my knowledge during my residence in Java. The only remark which I may venture to make with respect to the English mode of cultivation is, that by far the greater number of the quinine plants in the Anglo-Indian plantations appertain to the species producing the red bark, which requires an extraordinary degree of attention, the result being that that kind of bark is quoted at 2 s. 6 d. to 8 s. 9 d. in the London market. This high price, however, arises from the scarcity of that species of bark, which will become cheaper so soon as that scarcity is replaced by a larger amount of importation; for although the red bark is in general the richest of all others in alkaloids, it is nevertheless not so productive of quinine as the good species of Calisaya, so that I am inclined to think that the quinine manufacturers will at all times give the preference to the latter.

After this brief description of the mode of cultivation, both in Dutch and British India, there will be no difficulty in answering the question, which was started some time ago, as to whether the cultivation of quinine trees should not be made over to private enterprise.

As the quinine trees in Java must, according to the present mode of cultivation adopted in that island, be several years old (at least 30 years) before they are fully capable of yielding a good quality of bark, I very much doubt whether any capitalists would be found willing to employ their capital in that way for so long a period, and I feel bound, therefore, to answer that question in the negative. The English system, on the other hand, which admits of good interest on capital within, at the most, four years, and which continues regularly progressing in that respect, is certainly one which prepares the way for the transfer in due course of time of the cultivation under consideration to private industry; and, in fact, that principle has been already acted on in part, for, at the end of December 1863, not less than 7,532 quinine plants were delivered to private individuals at Ootacamund on payment of the stipulated price of 30 cents. each plant.

Should our enlightened Government therefore abandon, as I hope will be the case, the present mode of cultivation in Java, and replace it by the English one, not only will new prospects be opened for private enterprise, but another result will ensue, one to which I may be allowed to direct special attention in a few concluding words. It is to be regretted that the summits of many high mountains in Java have been so completely stripped of trees that the Governor General, Mr. Duymaer Van Twist, was induced some time ago to intrust to Mr. Junghuhn the task of superintending the then remaining forests. As it is necessary to plant the quinine trees at a great elevation, at least at a higher one than the coffee plantations, the English mode of cultivation would afford the means of covering those naked summits again with woods, even if it were only with a low growth of timber. The cost of planting would be amply recovered by the produce of the quinine bark thereby obtained, and the trees, when stripped of the bark, would supply the fuel now so scarce in that country.

Dr. J. E. De Vrij.

The Hague, 12 November 1864.

* "Pharmaceutical Journal," June, July, and August 1864.

— No. 37. —

From the Government of Madras to the Secretary of State for India.

Madras, 23 January 1865.

WE have the honour to forward for your information the accompanying Tabular Report on the number, condition, &c., of the Chinchona plants on the Neilgherries, on the 31st December 1864.

Enclosure in No. 37.

REPORT on the Number, Distribution, and Condition of Chinchona Plants on the Neilgherries, on the 31 December 1864.

Species.	Botanical Names.	Commercial Names.	Number of Plants.	Value per Lb. of Dry Bark in the London Market.	REMARKS.
1	<i>C. succirubra</i> - -	Red Bark - -	138,119	s. d. 2 6 to 8 9	The number of plants presently planted out in the plantations remain the same as at the end of the last month, namely, 165,351.
2	<i>C. calisaya</i> - -	Yellow Bark - -	2,560	2 10 to 7 0	
3	<i>C. officinalis</i> , var. <i>Condaminea</i> (<i>C. uritisinga</i>).	Original Loxa Bark	2,705	2 10 to 7 0	
4	<i>C. officinalis</i> , var. <i>Bonplandiana</i> (<i>C. chahuarguera</i>).	Select Crown Bark -	324,276	2 10 to 7 0	The increase by propagation during the month 24,006, being 3,024 plants at the average of the last six months, making the total number of plants at the end of the month 499,452.
5	<i>C. crespilla</i> - -	Fine Crown Bark -	2,367	2 10 to 6* 0	
6	<i>C. lancifolia</i> - -	Pitayo Bark - -	28	1 8 to 2 10	
7	<i>C. nitida</i> - -	Genuine Grey Bark -	8,500	1 8 to 2 9	
8	<i>C. Species</i> without name.	Fine Grey Bark -	2,786	1 8 to 2 10	
9	<i>C. micrantha</i> - -	Grey Bark - -	14,314	1 8 to 2 9	
10	<i>C. Peruviana</i> - -	Finest Grey Bark -	3,372	1 8 to 2 10	
11	<i>C. Pahudiana</i> - -	Unknown - -	425	Worthless.	
TOTAL Number of Plants - - -			499,452		

TABLE II.

MEMORANDUM of the Growth of Eleven Plants of *C. succirubra*, planted on the Second Denison Plantation at Neddivuttum, on the 30 August 1862.

Number of Plants.	Height in Inches when Planted on 30 August 1862.	Height in Inches on 30 November 1864.	Height in Inches on 31 December 1864.	Growth in Inches during Dec. 1864.	By whom Planted.
1	23	111	112	1	His Excellency Sir W. Denison.
2	16½	100¾	101	¼	
3	19	104½	104½	¼	
4	15	98¼	98¾	¾	J. W. Brecks, Esq.
5	27	117	117	0	
6	20	88	89	1	
7	20	107½	107¾	¼	Dr. Sanderson.
8	18	109	109	0	
9	20	111½	111½	0	
10	20	112¾	113	¼	J. D. Sim, Esq.
11	18	98	98¼	¼	
12	—	52	53	1	

TABLE II. exhibits the growth of eleven plants of *Chinchona succirubra* planted out by His Excellency the Governor and other gentlemen at Neddivuttum on the 30th August 1862; the average growth of these plants during the month is ¾ inch, but two inches under the growth of the month.

One of the two plants cut down on the 20th March 1863 for bark, submitted to Mr. Howard for analysis, has made six shoots of 53 inches in height, giving the growth of one inch during the month.

His Excellency Sir W. Denison.

J. W. Brecks, Esq.

Dr. Sanderson.

J. D. Sim, Esq.

Lieutenant McLeod.

P. Grant, Esq.

Plant cut down for bark.

TABLE III.

SHOWING the Height of Twelve Plants of *C. officinalis*, planted on the Dodabetta Plantation at Ootacamund, on 30 September 1863.

Number of Plants.	Height in Inches when Planted on 30 September 1863.	Height in Inches on 30 November 1864.	Height in Inches on 31 December 1864.	Growth in Inches during December 1864.	REMARKS.
1	19	65	67½	2½	The 12 plants of <i>Chinchona officinalis</i> (a shrubby species) on the Dodabetta plantation, give an average growth of 2½ inches, or ⅕ of an inch below the growth of last month.
2	14½	55½	58½	3	
3	28	70	73	3	
4	22	72	75	3	
5	21½	66½	69	2½	
6	28	73	76	3	
7	22½	65	68	3	
8	21½	65½	68	2½	
9	21½	72½	75	2½	
10	19½	68	71½	3½	
11	24	69½	72½	3	
12	24	69	71½	2½	

TABLE IV.

REGISTER of Chinchona Plants Distributed.

NAMES.	STATION.	Number of Plants.
Mr. F. N. Maltby	Travancore	16
Dr. Junghuhn	Java	56
Mr. A. R. Lascelles	Ootacamund	12
Mr. Anderson	Jamaica	2
Dr. Wiehe	Bombay	10
Dr. T. Anderson	Calcutta	554
Dr. Jamieson	Saharanpore	107
Professor Lees	Calcutta	547
Rajah of Travancore	Travancore	521
Major Morgan	Ootacamund	1,534
Mr. E. T. Fitzgerald	Calcutta	558
Mr. J. W. B. Money	- ditto -	1,369
Dr. W. Bourne	- ditto -	532
Captain Cox	Waynad	6
Mr. Hollock	- ditto -	2
Mr. T. Sheffield	Ootacamund	12
Dr. F. Day	Cochin	100
Mr. Brown	Tillicherry	12
Mr. J. Hall	Ootacamund	144
Mr. J. Knop	- ditto -	18
Captain Lees	Bengal	281
Mr. W. H. Rayne	Manantoddy	424
Reverend — Sawyer	Ootacamund	1,018
Mr. Friend	- ditto -	112
Mr. Hollock	- ditto -	1
Mr. J. Pierie	Seegoor	12
Colonel Scott	Ootacamund	1,226
Mr. Berend	Cachar	275
Rev. J. Hunter	Coonoor	12
Mr. J. Mullaly	- ditto -	24
Mr. W. H. Stanes	- ditto -	1,262
Colonel R. Cooper	Kotagherry	12
Mr. F. Cockburn	- ditto -	12
Colonel Woodfall	Coonoor	12
Mr. C. Anderson	- ditto -	24
Colonel Angelo	Ootacamund	12
Rev. E. Laseron	- ditto -	12
Captain R. N. Taylor	Coorg	96
Major W. Agnew	Assam	139
Mr. V. H. Levinge	Madura	12
Chief Commissioner of	Nagpore	28

The number of plants issued to the public is 200, making the total number of plants distributed 52,357.

TABLE IV.—REGISTER of Chinchona Plants Distributed—*continued*.

NAMES.	STATION.	Number of Plants.	REMARKS.
Mr. Fletcher - - - -	Ootacamund - -	24	
Gool Mahomed - - - -	- ditto - - -	20	
General McCleverty - - - -	New Zealand - -	23	
Mr. W. Robinson - - - -	Kotagberry - - -	30	
Mr. Crake - - - -	Wainad - - -	12	
Mr. H. R. Dawson - - - -	Seegoor - - -	12	
Captain Mann - - - -	Coorg - - -	48	
Mr. E. Roberts - - - -	- ditto - - -	530	
Mr. H. Russell - - - -	Wainad - - -	12	
Rev. — Wait - - - -	Coonoor - - -	2	
Collector of Belgaum - - - -	Belgaum - - -	28	
Collector of Honore - - - -	Honore - - -	28	
Dr. Ross - - - -	- ditto - - -	15	
His Excellency the Governor - - - -	Bombay - - -	158	
Mr. H. Hinde - - - -	Waynad - - -	12	
Mr. E. B. Thomas - - - -	Coonoor - - -	12	
Rajah of Poonganoor - - - -	Poonganoor - - -	12	
Major Grant - - - -	Wellington - - -	226	
Messrs. Thomson, Shaw, & Co. - - - -	Poonganoor - - -	28	
Mr. J. H. Trinson - - - -	- ditto - - -	31	
Dr. Muller - - - -	Melbourne - - -	28	
Mr. Tyrrell - - - -	Mysore - - -	12	
Dr. Sayers - - - -	Vellore - - -	12	
Major C. P. Taylor - - - -	Ootacamund - - -	5,250	
Dr. Wilson - - - -	- ditto - - -	6	
Mr. Schnarie - - - -	- ditto - - -	15,000	
Captain Fuller - - - -	Coonoor - - -	266	
Mr. Drummond - - - -	Ootacamund - - -	224	
Captain Jennings - - - -	- ditto - - -	1,756	
Lieut. E. B. Montmorency - - - -	Bangalore - - -	6	
Mr. McHutchin - - - -	Ootacamund - - -	3	
Colonel Molesworth - - - -	- ditto - - -	6	
Mr. C. Gray - - - -	Coonoor - - -	12	
Mr. H. B. Leddell - - - -	Ootacamund - - -	12	
Mr. Minchin - - - -	Waynad - - -	1,600	
His Excellency the Governor - - - -	Vizagapatam - - -	35	
Mr. R. F. Phillips - - - -	Kotagberry - - -	1,117	
Colonel Cooke - - - -	- ditto - - -	24	
Mr. G. J. Glasson - - - -	Waynad - - -	1,000	
Dr. Macpherson - - - -	Mercara - - -	400	
Mr. W. H. Kerr - - - -	Coorg - - -	3,100	
Mr. James - - - -	Ootacamund - - -	1,000	
Colonel Whish - - - -	Bengal - - -	82	
Mr. K. Mair - - - -	Calcutta - - -	1,180	
Mr. W. Shakespear - - - -	- ditto - - -	61	
Mr. E. E. Meakin - - - -	- ditto - - -	168	
Mr. C. Ackland - - - -	- ditto - - -	150	
Mr. K. McIver - - - -	- ditto - - -	124	
Mr. Havelock - - - -	Ootacamund - - -	12	
Mr. H. de Facien - - - -	Kartairy - - -	6,821	
Major Sweet - - - -	- ditto - - -	102	
Captain Campbell - - - -	Bangalore - - -	6	
Royal Gardens - - - -	Mauritius - - -	36	
Hon. W. R. Arbuthnot - - - -	Waynad - - -	93	
Mr. H. Maxwell - - - -	Bombay - - -	50	
Mrs. C. Smith - - - -	Waynad - - -	22	
Captain Beckley - - - -	Wellington - - -	200	
TOTAL Number of Plants - - -		52,357	

Ootacamund,
12 January 1865.

(signed) W. G. McIvor,
Superintendent Government Chinchona Plantations.

— No. 38. —

From the Government of Madras to the Secretary of State for India.

Madras, 22 February 1865.

WE have the honour to forward for your information the accompanying Tabular Report on the number, condition, &c., of the Chinchona plants on the Neilgherries on the 31st January 1865.

Enclosure in No. 38.

REPORT on the Number, Distribution, and Condition of Chinchona Plants on the Neilgherries, on the 31 January 1865.

No. of Species.	Botanical Names.	Commercial Names.	Number of Plants.	Value per Lb. of Dry Bark in the London Market..		REMARKS.
				s.	d.	
1	<i>C. succirubra</i> - -	Red Bark - -	144,340	2	6 to 8	The number of plants permanently planted out in the plantations remains the same as last month, namely, 165,351.
2	<i>C. Calisaya</i> - -	Yellow Bark - -	2,580	2	10 to 7	
3	<i>C. officinalis</i> , var. <i>Condaminiana</i> (<i>C. Uritus-singa</i> .)	Original Loxa Bark	2,981	2	10 to 7	
4	<i>C. officinalis</i> , var. <i>Bonplandiana</i> (<i>C. Chahuarguera</i>).	Select Crown Bark -	334,716	2	10 to 7	The increase by propagation is 17,231, being 2,122 plants under the average of the last six months, making the total number of plants at the end of the month 516,683.
5	<i>C. crespilla</i> - -	Fine Crown Bark -	2,498	2	10 to 6	
6	<i>C. lancifolia</i> - -	Pitayo Bark - -	30	1	8 to 2 10	
7	<i>C. nitida</i> - -	Genuine Grey Bark	8,500	1	8 to 2 9	
8	<i>C. Species</i> without name.	Fine Grey Bark -	2,786	1	8 to 2 10	
9	<i>C. micrantha</i> - -	Grey Bark - -	14,555	1	8 to 2 9	
10	<i>C. Peruviana</i> - -	Finest Grey Bark -	3,372	1	8 to 2 10	
11	<i>C. Pahudiana</i> - -	Unknown - -	425	Worthless.		
TOTAL Number of Plants - - -			516,683			

TABLE II.

MEMORANDUM of the Growth of Eleven Plants of *C. succirubra*, planted on the Second Denison Plantation at Neddivuttum, on 30 August 1862.

Number of Plants.	Height in Inches when Planted, 30 August 1862.	Height in Inches on 31 December 1864.	Height in Inches on 31 January 1865.	Growth in Inches during January 1865.	By whom Planted.
1	23	112	113 $\frac{1}{4}$	1 $\frac{1}{4}$	His Excellency Sir W. Denison.
2	16 $\frac{1}{2}$	101	102	1	
3	19	104 $\frac{1}{2}$	105 $\frac{1}{4}$	$\frac{3}{4}$	
4	15	98 $\frac{3}{4}$	99	$\frac{1}{4}$	
5	27	117	117 $\frac{1}{2}$	$\frac{1}{2}$	
6	20	89	90	1	J. W. Breeks, Esq. Dr. Sanderson. J. D. Sim, Esq. Lieutenant McLeod. P. Grant, Esq. Plant cut down for bark.
7	20	107 $\frac{3}{4}$	108	$\frac{1}{4}$	
8	18	109	109 $\frac{1}{2}$	$\frac{1}{2}$	
9	20	111 $\frac{1}{4}$	112	$\frac{1}{4}$	
10	20	113	114	1	
11	18	98 $\frac{1}{4}$	98 $\frac{3}{4}$	$\frac{1}{2}$	
12	-	53	53 $\frac{1}{2}$	$\frac{1}{2}$	

TABLE II. exhibits the growth of 11 plants of *Chinchona succirubra* planted out by his Excellency the Governor, and other gentlemen, at Neddivuttum, on the 30th August 1862. The average growth of these plants during the month is $\frac{3}{4}$ ths of an inch, being about $\frac{1}{2}$ an inch above the growth of last month.

One of the two plants cut down on the 20th of March 1863 for the bark, submitted to Mr. Howard for analysis, has made strong shoots of 53 $\frac{1}{2}$ inches in height, giving the growth of $\frac{1}{2}$ an inch during the month.

TABLE III.

SHOWING the Height of Twelve Plants of *C. officinalis*, planted on the Dodabetta Plantation at Ootacamund, on the 30th September 1863.

Number of Plants.	Height in Inches when Planted, on 30 September 1863.	Height in Inches on 31 December 1864.	Height in Inches on 31 January 1865.	Growth in Inches during January 1865.	REMARKS.
1	19	62½	70	2½	The 12 plants of <i>C. officinalis</i> (a shrubby species) on the Dodabetta Plantation, give an average growth of 2½ inches, or ½ th of an inch below the growth of last month.
2	14½	58½	61½	3	
3	28	73	75	2	
4	22	75	78½	3½	
5	21½	69	71½	2½	
6	28	76	79	3	
7	22½	68	71	3	
8	21½	68	71	3	
9	21½	75	79	3	
10	19½	71½	73	1½	
11	24	72½	75	2½	
12	24	71½	74	2½	

TABLE IV.

REGISTER of Chinchona Plants Distributed.

NAMES.	STATION.	Number of Plants.
Mr. F. N. Maltby - - - -	Travancore - - -	16
Dr. Junghuhn - - - -	Java - - -	56
Mr. A. R. Lascelles - - -	Ootacamund - - -	12
Mr. M. Anderson - - - -	Jamaica - - -	2
Dr. Wiehe - - - -	Bombay - - -	10
Dr. T. Anderson - - - -	Calcutta - - -	554
Dr. Jamieson - - - -	Saharanpore - - -	107
Professor Lees - - - -	Calcutta - - -	547
Rajah of Travancore - - -	Travancore - - -	521
Major Morgan - - - -	Ootacamund - - -	1,534
Mr. E. T. Fitzgerald - - -	Calcutta - - -	558
Mr. J. W. B. Money - - - -	ditto - - -	1,369
Dr. W. Bourne - - - -	ditto - - -	532
Captain Cox - - - -	Wynad - - -	6
Mr. Hollock - - - -	ditto - - -	2
Mr. T. Sheffield - - - -	Ootacamund - - -	12
Dr. F. Day - - - -	Cochin - - -	100
Mr. Brown - - - -	Tellicherry - - -	12
Mr. J. Hall - - - -	Ootacamund - - -	144
Mr. J. Knop - - - -	ditto - - -	18
Captain Lees - - - -	Bengal - - -	281
Mr. W. H. Rayne - - - -	Manantoddy - - -	424
Rev. — Sawyer - - - -	Ootacamund - - -	1,018
Mr. Frend - - - -	ditto - - -	112
Mr. Hollock - - - -	ditto - - -	1
Mr. J. Pierie - - - -	Seegoor - - -	12
Colonel Scott - - - -	Ootacamund - - -	1,226
Mr. Berend - - - -	Cachar - - -	275
Rev. J. Hunter - - - -	Coonoor - - -	12
Mr. J. Mullaly - - - -	ditto - - -	24
Mr. W. H. Stanes - - - -	ditto - - -	1,262
Colonel R. Cooper - - - -	Kotagherry - - -	12
Mr. F. Cockburn - - - -	ditto - - -	12
Colonel Woodfall - - - -	Coonoor - - -	12
Mr. C. Anderson - - - -	ditto - - -	24
Colonel Angelo - - - -	Ootacamund - - -	12
Rev. E. Laceron - - - -	ditto - - -	12
Captain R. N. Taylor - - -	Coorg - - -	96
Major W. Agnew - - - -	Assam - - -	139
Mr. V. H. Levinge - - - -	Madura - - -	12
Chief Commissioner of Nagpore	Nagpore - - -	28
Mr. Fletcher - - - -	Ootacamund - - -	24
Gool Mahomed - - - -	ditto - - -	20

Not having issued any plants to the public during the month, the total number of plants distributed remain the same as last month, viz., 52,367.

TABLE IV.—Register of Chinchona Plants Distributed—*continued*.

NAMES.	STATION.	Number of Plants.	REMARKS.
General McCleverty - - -	New Zealand - - -	23	
Mr. W. Robinson - - -	Kotagherry - - -	30	
Mr. Crake - - -	Wynad - - -	12	
Mr. H. R. Dawson - - -	Seegoor - - -	12	
Captain Mann - - -	Coorg - - -	48	
Mr. E. Roberts - - -	ditto - - -	530	
Mr. H. Russell - - -	Wynad - - -	12	
Reverend — Wait - - -	Coonoor - - -	2	
Collector of Belgaum - - -	Belgaum - - -	28	
Collector of Honore - - -	Honore - - -	28	
Dr. Ross - - -	ditto - - -	15	
His Excellency the Governor	Bombay - - -	158	
Mr. H. Hinde - - -	Wynad - - -	12	
Mr. E. B. Thomas - - -	Coonoor - - -	12	
Rajah of Poonganoor - - -	Poonganoor - - -	12	
Major Grant - - -	Wellington - - -	226	
Messrs. Thomas, Shaw & Co. -	Poonganoor - - -	28	
Mr. J. H. Trinson - - -	ditto - - -	31	
Dr. Muller - - -	Melbourne - - -	28	
Mr. Tyrrell - - -	Mysore - - -	12	
Dr. Sayers - - -	Vellore - - -	12	
Major C. P. Taylor - - -	Ootacamund - - -	5,250	
Doctor Wilson - - -	ditto - - -	6	
Mr. Schnarrie - - -	ditto - - -	15,000	
Captain Fuller - - -	Coonoor - - -	266	
Mr. Drummond - - -	Ootacamund - - -	224	
Captain Jennings - - -	ditto - - -	1,756	
Lieut. H. B. Montmorency - -	Bangalore - - -	6	
Mr. McHutchin - - -	Ootacamund - - -	3	
Colonel Molesworth - - -	ditto - - -	6	
Mr. C. Gray - - -	Coonoor - - -	12	
Mr. H. B. Leddell - - -	Ootacamund - - -	12	
Mr. Minchin - - -	Wynad - - -	1,600	
His Excellency the Governor -	Vizagapatam - - -	35	
Mr. R. F. Phillips - - -	Kotagherry - - -	1,117	
Colonel Cooke - - -	ditto - - -	24	
Mr. G. J. Glasson - - -	Wynad - - -	1,000	
Dr. Macpherson - - -	Mercara - - -	400	
Mr. W. H. Kerr - - -	Coorg - - -	3,100	
Mr. James - - -	Ootacamund - - -	1,000	
Colonel Whish - - -	Bengal - - -	82	
Mr. K. Mair - - -	Calcutta - - -	1,180	
Mr. W. Shakespear - - -	ditto - - -	61	
Mr. E. E. Meakin - - -	ditto - - -	168	
Mr. C. Ackland - - -	ditto - - -	150	
Mr. K. M'Iver - - -	ditto - - -	124	
Mr. Havelock - - -	Ootacamund - - -	12	
Mr. H. de Facien - - -	Kartairy - - -	6,821	
Major Sweet - - -	ditto - - -	102	
Captain Campbell - - -	Bangalore - - -	6	
Royal Gardens - - -	Mauritius - - -	36	
Honourable W. R. Arbuthnot	Wynad - - -	93	
Mr. H. Maxwell - - -	Bombay - - -	50	
Mrs. C. Smith - - -	Wynad - - -	22	
Captain Beckley - - -	Wellington - - -	200	
TOTAL Number of Plants - - -		52,357	

Ootacamund,
15 February 1865.

(signed) W. G. McIvor,
Superintendent Government Chinchona Plantations.

— No. 39. —

From the Government of Madras to the Secretary of State for India.

Madras, 14 March 1865.

1. WE have the honour to forward the accompanying very satisfactory Report from Mr. McIvor on the Government Chinchona Plantations and Botanical Gardens, for the official year 1863-64, together with our Proceedings thereon, dated 9th instant, No. 273.

2. You will observe from paragraphs 39 and 40 of the Report that the seeds of Chinchona Pitayensis, received by Mr. McIvor in April last, have entirely failed; and we request that you will endeavour to procure and forward to us a further supply of fresh seeds of these plants.

— No. 40. —

From *W. G. McIvor*, Esq., Superintendent Government Chinchona Plantations, to the Honourable *A. J. Arbuthnot*, Chief Secretary to Government.

Sir,

Ootacamund, 9 July 1864.

1. I HAVE the honour to forward herewith the Report on the Government Chinchona Plantations and Botanical Gardens for the official year 1863-64.

2. As modifications in our system of cultivation have been found necessary, and as it may be inconvenient to print the whole of the report in pamphlet form, $6 \times 9\frac{1}{2}$ inches, I would respectfully solicit the favour of 300 copies of paragraphs, 9 to 13 and 24 to 38 inclusive, be printed and furnished to me, in order that they may be attached to "Notes on Cultivation" published in 1863, and distributed to cultivators.

— No. 41. —

REPORT on the Government Chinchona Plantations and Botanical Gardens for 1863-64.

Introductory observations.

Increase of propagation.

Height and growth of plants.

Increase in thickness of stems, and growth of lateral branches.

Condition of plants on Dodabetta plantation; elevation 8,000 feet.
Make less perpendicular growth, but more robust than at lower elevations.

Grow well in all exposures on this site.

Analysis of bark show great increase in alkaloids.

1. NOTWITHSTANDING the unusually trying seasons of the past official year, it affords me much satisfaction to be able to state, that our Chinchona plants have, in every respect, made most satisfactory progress. In the propagation still greater results have been obtained than those previously described, the maximum monthly produce of 32,408 plants were obtained in February last, the average being 15,326. The oldest plants, viz., those permanently planted out in August 1862, have attained heights varying from 6 to 9 feet with thick stems well furnished with lateral branches, and presenting as robust and healthy an appearance as could be wished. Like most trees of their age these plants are not now making so much perpendicular growth as they did in the first year, in consequence of the number of branches thrown out, whereby the direct flow of sap is diverted from the leading shoots; the plants nevertheless are gaining in thickness more than they have hitherto done. The Chinchona officinalis, Bonplandiana, and crespilla have been found to succeed best on the Dodabetta plantation (about 8,000 feet elevation), where the plants are robust and luxuriant, although not making so great perpendicular growth as at lower elevations. The 1st Dodabetta plantation possesses every exposure and many varieties of soil, and over the whole of this site these three species have been found to thrive well. The result of this year's analysis has also established an extraordinary increase in the yield of alkaloids, showing the product to be 6 per cent. of rough alkaloids, while the previous analysis gave 4.3 per cent. From these observations

observations it is plain that Peruvian bark will now be secured to India as one of its products. The cultivation of these very valuable plants has produced results far beyond our original expectations, and now that we have obtained considerable experience in their management, greater progress may reasonably be expected. With these preliminary remarks, I proceed to particulars which, for the sake of convenience, are arranged under the following heads:

Progress of the plants exceeds original expectations.

	Paras.
1. Growth and condition of plants - - - - -	2 to 13
2. Cultivation, results obtained by private planters in the	14 to 15
3. " prospects of its spread and increase - -	16
4. " influence of woods on rain-fall and climate	17 to 23
5. " modification of former treatment - -	24 to 28
6. " under the shade of living trees and in the open ground - - - - -	29 to 30
7. " effects of storms and of wet and dry weather on - - - - -	31 to 33
8. Gathering of the bark and treatment of plant for this purpose - - - - -	34 to 38
9. Chinchona Pitayœnsis, attempt to introduce, value, &c.,	39 to 40
10. Establishments - - - - -	41
11. Progress of operations - - - - -	42 to 46
12. Botanical Gardens - - - - -	47 to 48
13. Concluding remarks - - - - -	49

Heads of report.

Appendix A.—Accounts from commencement of operations to 30th April 1864.

Do. B.—Meteorological observations - Neddivuttum.

Do. C. Ditto - ditto - Ootacamund.

2. Our first plants were permanently planted on the Neddivuttum plantation in August 1862. Eleven plants of *C. succirubra* selected for measurement, planted on the 30th idem by his Excellency Sir William Denison and other gentlemen, have made an average growth of 3 feet from the date of being planted to the 30th April 1863 (nine months), and from the 1st May 1863 to 30th April 1864, 2 feet 11 inches; this it may be estimated is 3 inches in excess of the average growth of the whole of the plants of this species throughout the plantations; the older plants have gained much in thickness during the last year, and thrown out many strong branches varying from 1 to 5 feet in length.

Growth and condition of plants of the 1st and 2nd Denison plantations at Neddivuttum.

Attained 3 feet in height in first nine months;

2 feet 11 inches in the preceding 12 months.

Increased considerably in thickness and lateral growth.

3. The bark has also much improved, the thickness having increased considerably; the transverse marking characteristic of the finest Peruvian bark becoming very apparent, and rudimentary lichens and mosses have begun to develop themselves on the bark of the older plants, while their sturdy and robust habit indicates, beyond all doubt, that the Chinchona, in its new home, has found conditions quite as favourable to its growth and full development as in the most favourable localities on the Andes. The above remarks refer principally to the *C. succirubra*, that species being more extensively planted on the Denison plantations, and found to thrive well at elevations varying from 4,000 to 6,000 feet.

Favourable appearance of bark.

Robust habit, indicating existence of as favourable conditions to growth in this locality as on the Andes.

C. succirubra or red bark, flourishing at elevations of 4,000 and 6,000 feet.

C. Calisaya or yellow bark, of slower growth than *C. succirubra*.

Producing only half quantity of bark in the same period.
Plants healthy and robust.

4. The *C. Calisaya* on the same plantations gives an average annual perpendicular growth of 2 feet 4 inches, or 7 inches less than that of *C. succirubra*, the stems however have not increased in proportion; in fact, the stems of this valuable species do not give one-half the average diameter of plants of *C. succirubra* of the same age, and consequently not more than one-half the quantity of bark in the same period of growth, the plants are nevertheless healthy and robust; yet, in a commercial point of view, its comparative slow growth will, I fear, operate against its extensive cultivation.

The *C. micrantha*, Peruviana, and nitida or grey barks, made annual growth of 2 feet 8 inches.

5. The *C. micrantha*, Peruviana, and nitida, have maintained an average growth almost identical with that of *C. succirubra*, viz., 2 feet 8 inches, but the bark formed by these species is fully one-fifth thinner than that of the *C. succirubra*.

C. officinalis or crown bark, on Markham plantation.

C. succirubra and *Calisaya*.

On the Wood plantation at Pykara, two species planted, viz. *C. succirubra* or red bark, and *C. officinalis* crown bark.

1st Dodabetta plantation, elevation 830 to 8,350 feet.

Too cold for *C. micrantha* and *C. succirubra*.

Here all species of crown bark thrive better than at lower elevations.

The important fact is established, that these species may be successfully cultivated all over the plateau of the eigherries.

thus opening an extensive field for enterprise;

and places cultivator in healthy and invigorating climate.

C. succirubra grows at elevations from 3,000 to 6,000 feet.

the most hardy of all the species.

5,000 feet the best elevation for *Calisaya* or yellow bark.

Grey barks thrive best at elevations of about 4,500 to 6,000 feet.

Crown barks at elevations from 3,000 to 8,500 feet.

Makes more perpendicular growth at lower elevations, but is not so robust.

Two plants of *C. lancifolia*, Pitayo bark, planted out at an elevation of 6,600 feet, appears to require the same elevation as the crown barks.

Results obtained by private planters in the cultivation of chinchona.

In the first instance great loss of plants sustained by Professor Lees and M. de Facien, experience suggested a remedy, and now successful.

Successful also in North-West Provinces, Mahableshwar, Belgaum, and Honore; Darjeeling; Assam and Cachar; Wynaad;

On the eastern slopes of the Neilgherries.

6. About 25,000 plants of *C. officinalis*, planted on the Markham plantation (elevation 5,000 to 6,000 feet) have grown taller, but not so robust as plants at higher elevations. Here however the *C. succirubra* and *Calisaya* have made growth quite equal to any of the plants of the species on the Denison plantation.

7. On the Wood plantation at Pykara, the *C. succirubra* and *officinalis* only have been planted, and have made progress equal to the plants at Neddivuttum.

8. On the 1st Dodabetta plantation (elevation varying from 7,830 to 8,350 feet), the progress of the *C. succirubra*, and *C. micrantha* has been unsatisfactory, the elevation being apparently too great; but the *C. officinalis*, Bonplandina (*Condaminea*), and *crepilla* have succeeded better than on any other of our plantations, that is, the plants have grown more robust and luxuriant, and this even on the most exposed parts of the plantation; and the important fact is now established, that these three species can, with ordinary care and skill, be successfully cultivated over the whole of the plateau of the Neilgherries, thus opening out an immense field for the development of enterprise and energy, with profitable employment of time and capital, and, in addition, the cultivator will be placed in perhaps the most healthy and invigorating climate in the world.

9. Forming an opinion on our experience up to the present time, the elevations best suited to the growth of the different species of chinchona appears to be in this latitude for the *succirubra*, from 3,000 to 6,000 feet, probably thriving best at altitudes from 4,500 to 6,000. This is perhaps the hardiest species in cultivation, bearing, without material injury, greater extremes of heat and cold than any of the other species yet introduced.

10. *C. Calisaya* thrives best at an elevation of about 5,000 feet; it appears not to bear a high temperature, although in the Wynaad district it grows at 3,000 feet.

11. The *C. Peruviana*, *nitida*, and *micrantha* grow well at elevations of 4,500 feet, and in sheltered localities at 6,000 feet.

12. *C. officinalis* and its varieties, flourish best at elevations from 7,000 to 8,500 feet; it makes rapid perpendicular growth at lower elevations, but is not so robust and luxuriant.

13. Of the *C. lancifolia*, only two plants have been tried at an elevation of 7,600 feet; these stood the cold of last winter without injury, and the species may probably be found to require the same elevations as *C. officinalis* and its varieties.

14. Upwards of 60 persons have, in a greater or less degree, undertaken the cultivation of chinchona, but, as was to be expected, with varied results; the efforts of some being highly successful, while others met with comparative failures; among the most unsuccessful attempts may be mentioned those of Professor Lees and M. de Facien, both of these gentlemen, in the first instance, lost nearly four-fifths of their plants either in transit or in the nurseries. Experience, however, has pointed out a remedy; and I learn from Mr. Lees' superintendent that his plants are now doing well, and that he is propagating them at the rate of 200 per mensem. M. de Facien also writes, that his plants "are, since the shade has been removed, growing as they never did before."

15. In the North-West Provinces considerable success has been obtained, as also in Mahableshwar, Belgaum, Honore, and elsewhere in the Bombay Presidency. From Darjeeling I learn that Mr. Fitzgerald received all his plants in excellent condition. From Assam and Cachar the accounts are varied. The Wynaad coffee planters have been generally successful with the plants forwarded to them, and on the eastern side of these hills a similar success has been gained.

I learn

I learn from Mr. Mullaly that the plants he received have made great progress. In Coorg and Nuggur the success seems to be general, and several planters there contemplate embarking largely in the cultivation. It will be observed that in little more than two years upwards of 31,000 chinchona plants have been supplied from Ootacamund to every district in India considered suitable to their growth.

16. The cultivation is one in which planters are eager to embark, as in fact it offers advantages which no other on the Neilgherries possesses. It promises a greater return on the capital invested than coffee, while the cultivation can be carried on in a healthy climate; the plants, when once established, are easily managed; the preparation of the bark is much more simple than that of the manipulation of tea, and after three years' growth the plantations can be maintained at little cost. These advantages are sufficiently understood and recognised to induce a number of cultivators to enter the field; consequently the applications for plants have been numerous, many of these, however, to the extent of upwards of 50,000 plants, have lately been relinquished in consequence of the applicants being unable to procure the land they had selected, being informed that it was reserved. The loss of time and trouble thus incurred has had the effect of discouraging further applications, the more especially as an impression prevails that no forest land on the Neilgherries will in future be sold. I submit that this impediment may be removed by the reserved lands being marked on a map kept in the Collector's office for reference; this would facilitate the extension of chinchona cultivation, as parties would then select unreserved land with a certainty of its being put up to auction three months after date of application. I make these remarks as all the lands on the slopes and on the plateau of the Neilgherries is well suited to the growth of the different species of chinchona, and in a philanthropic as well as revenue point of view it seems desirable that all obstructions be removed, and every legitimate encouragement afforded to bring all available lands under cultivation.

17. In the preceding paragraph it has been stated that upwards of 50,000 chinchona plants have been relinquished, owing to the difficulty of procuring land, in consequence, I am informed, of an opinion that felling the forests on the Neilgherries causes a deterioration of climate and deficiency in the rainfall, which it is stated does not now extend so far into the Coimbatore district as formerly, owing to the forests on the Neilgherries having been felled for the cultivation of coffee and other products. If this impression could be shown to be correct, it would be important to maintain the fertility of the Coimbatore district by preserving the natural forests on the Neilgherries. But theory and observation, combined with experience of practical effects, prove this conclusion to be erroneous. The Neilgherries, like other high mountain ranges, generate and are covered by a cold stratum of air which condenses the moisture contained in the warm atmosphere in its passage from the sea; hence, if our hills were 4,000 feet lower, the temperature of the stratum of air would be increased, consequently its condensing powers reduced, and thus the rains at Coimbatore would be nearly as copious during the western monsoon as on the Malabar coast. On the contrary, were the Neilgherries 7,000 or 7,500 feet above their present elevation, then not a drop of rain would pass over the hills, as every particle of moisture in the heated air from the sea would be precipitated by coming in contact with a freezy atmosphere; in this case not only Coimbatore, but the whole of the eastern side of the hills would be devoid of rain, while torrents would fall on the western face, as exemplified in many parts of the Andes and the Himalayas, in short the same effect takes place in a greater or less degree on all mountain ranges according to their elevation. On the sea face of the Scandinavian Alps, there is an annual rainfall of 80·12 inches, while on the other side the mean annual fall is only 20 inches.

In Coorg and Nuggur the cultivation most successful and encouraging.

31,000 chinchona plants supplied from Ootacamund to every district in India suitable to their growth.

Prospects of the spread and increase of chinchona cultivation.

Inducements to cultivate chinchona in preference to other products.

Many speculators have undertaken the cultivation of chinchona.

50,000 plants relinquished by applicants in consequence of difficulty in procuring land.

On application, informed it was reserved.

Suggests that the lands reserved be marked on a map kept in the Collector's office for reference.

All the lands on the Neilgherries suitable to the growth of chinchona.

Desirable to remove impediments, and encourage extension of the cultivation.

Influence of trees on rainfall and climate.

Forest land reserved in consequence of an impression that clearing the trees causes a deficiency of rain on the hills and the Coimbatore district.

Impression erroneous.

In south-west monsoon rainfall in the Coimbatore district, dependent on the elevation and temperature of Neilgherries.

Examples.

Trees increase rainfall by increasing cold stratum of air.

More effectually deprive clouds of moisture in passing over the Neilgherries.

The more trees on the Neilgherries the less rain at Coimbatore.

Evaporation great cooling agent.

A tree of 45 feet in height, covering 100 square feet of ground, adds 80 times to the evaporating surface, without completely destroying the evaporation from the ground it covers.

Leaf evaporates one-fifth part of water raised from the same surface of moist ground, and one-fortieth part of that raised from the surface of water.

When the air becomes saturated, evaporation ceases, and leaves imbibe moisture.

In wet weather, trees increase rainfall and deposit of dew.

In dry weather a counterbalancing agency at work, making trees a far greater drain on the springs of the Neilgherries than a source of supply.

Trees draw the moisture they evaporate from considerable depth, and thus intercept its passage to the streams.

Is dissipated, never to return.

Trees covering 100 superficial feet of surface, evaporates 6 cubic feet of water every warm and dry day.

18. That trees do exercise considerable influence on the rainfall is undoubted, as, by offering a large evaporating surface, they increase the cold stratum of air which causes condensation. In this way they aid more effectually to wring the clouds of moisture in their passage over the Neilgherries. Hence, it is evident that the more abundant the trees on the Neilgherries, the more effectually is the Coimbatore district deprived of the western rains.

19. Evaporation is, in fact, the principal cooling agent on the globe, being always in proportion to the amount of exposed surface. Suppose, for example, a tree of 45 feet in height, covering 100 square feet of the surface of the ground, this tree will, at the lowest calculation, present an evaporating surface of at least 8,000 square feet, as evaporation goes on from every leaf and green shoot, and unless under very dense shade, the evaporation and radiation from the 100 square feet of ground it covers would not be entirely destroyed; thus a tree increases 80 times the evaporating surface, and would perspire from two to three times the amount of water that would be evaporated from the ground were the tree felled, as the average evaporation from the surface of a leaf is only $\frac{1}{25}$ th part of that from a similar surface of moist ground, and $\frac{1}{40}$ th from the same surface of water, all being under the same relative conditions. However, as the air becomes charged with moisture, evaporation from the surface of the leaves becomes less active, and ceases entirely at saturation, when another function directly the reverse commences; the leaves now beginning to imbibe moisture.

20. From the above point of view it is obvious that trees exercise considerable influence on the rainfall and deposit of dew. But there exists another and counterbalancing effect too frequently overlooked, which makes trees in a climate like ours a far greater drain on the moisture than they prove a source of supply. It has been shown that trees, by expending moisture (evaporation) convey to the air the power (cold) of condensing moisture; hence, it becomes an object of inquiry to ascertain how far the waste exceeds the supply gained by this process, especially on these hills where we have about three months of continuous clear weather, and dry atmosphere, with a difference of from 8° to 13° Fahrenheit between the wet and dry bulb thermometers. Here large extents of evaporating foliage throw off daily an enormous quantity* of moisture, drawn from a depth of the soil so far as the roots penetrate; this moisture, which would otherwise have supplied the springs, is thrown off by the leaves into the dry and arid atmosphere, where it is dissipated and driven by currents of air into higher latitudes.

21. A tree, 45 feet high, and covering 100 superficial feet, throws off at least six cubic feet of water every warm and dry day. An acre would contain 433 of such trees; but, reduce this number to 300, and

* "Vegetable Statistics" by Dr. Hales, quoted in Lindley's "Introduction to Botany," Volume II., pp. 288, 289, 291.

"July 3rd, 1824.—In order to find out the quantity imbibed and perspired by the sunflower, I took a garden pot with a large sunflower, 3½ feet high, which was purposely planted in it when young. I covered the pot with a plate of thin milled lead, and cemented all the joints fast, so as no vapour could pass, but only air, through a small glass tube nine inches long, which was fixed purposely near the stem of the plant, to make a free communication with the outward air, and that under the leaden plate. I cemented also another short glass tube into the plate, two inches long and one inch in diameter. Through this tube I watered the plant and then stopped it up with a cork; I stopped up also the holes at the bottom of the pot with corks. I found the greatest perspiration of twelve hours in a very warm dry day to be one pound fourteen ounces, the middle rate of perspiration one pound four ounces. The perspiration of a dry warm night without any sensible dew was about three ounces."

"From July 3rd to August 3rd, I weighed, for nine several mornings and evenings, a middle size cabbage plant, which grew in a garden pot, and was prepared with a leaden cover as the sunflower. Its greatest perspiration in twelve hours was one pound nine ounces, its middle perspiration one pound three ounces, 32 cubic inches."

and it gives a daily evaporation, from every acre of forest, of 1,800 cubic feet, or the enormous quantity of upwards of 11,000 gallons; yet, incredible as this may appear, it does not represent one-half the moisture thrown off daily by an acre of forest on the Neilgherries during the months of January, February, and March. In each year the average number of warm and dry days exceeds 190, but reduce this number to 150, and we have upwards of a million and a half gallons of water extracted from the soil and dissipated by every acre of forest. The practical effect of an agency so enormous is very apparent on the springs and streams on the Neilgherries, as all springs arising in, and passing through, valleys destitute of trees, maintain their flow throughout the dry season far better than those which arise in, and pass through, wooded valleys; it being obvious that the roots of the trees intercept and drink up the water in its descent through the soil to the streams. Many extraordinary convincing proofs of this potent agency are to be met with on the Neilgherries; and I give, as an example, the spring that supplies the Botanical Gardens here, which has its rise in the valley partially cleared of forest two years ago for the first Dodabetta plantation, the flow of water in the stream during the last excessively dry season was fully twice as much as prior to the forest being felled.

In 150 clear and dry days in the year upwards of a million and a half gallons of water dissipated by every acre of forest.

Practical effect apparent on the streams and springs.

Streams arising in, and flowing through, valleys destitute of trees, maintain their flow much better than springs arising in and passing through wooded valleys.

Many convincing examples to be met with on the hills.

An example in the stream which supplies the Government gardens.

22. The foregoing favours the opinion that if the Neilgherries were destitute of forest, the streams in the dry season would carry to the low country a flow of water twice as much as they do at present. But the great advantages which trees bestow cannot be overlooked; they improve the soil on which they grow, render the temperature more equable, reduce the violence of storms, afford shelter and shade very grateful to man, and their presence gives a pleasing effect to the eye, while their gaseous emanations are highly beneficial to animal life. These advantages, apart from their conomical uses, require (so far as is consistent with general cultivation) the presence of trees in every locality where they can be produced.

Neilgherries destitute of trees, twice as much water would flow to the low country during the dry season.

Advantages of trees.

23. In the above observations the important fact has not been taken into consideration, that the trees forming the natural forests on the plateau and upper slopes of the Neilgherries are quite useless except for firewood, and that planting chinchonas would be substituting valuable for worthless trees. My object in introducing this subject is to show the reservation of the natural forests to be unnecessary so far as they affect the local rainfall and that of the Coimbatore District.

Object of foregoing remarks.

To show the reservation of natural forests, fails to increase rainfall.

24. The treatment described in previous reports and "Notes on Cultivation, 6th March 1863," has been found generally adapted to the requirements of the plants, especially as regards their propagation. In transplanting from the propagating houses into the nurseries, a modification has been found necessary. In order to enable the plants to be removed without damage to their roots, a layer of moss is introduced under each line of plants.

Cultivation; modification of former treatment.

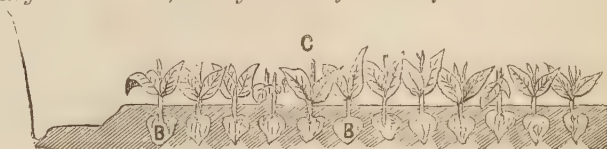
Transplanting plants in nurseries.

A represents a transverse section of the nursery bed, with moss B introduced, C being the longitudinal section. The manner in which the plants are planted being the same as described in paragraph 26, it being essential to success not to catch the roots of the plants in the hand, as the least bruise destroys them, therefore the plants should invariably be lifted by the leaves.

Roots must not be handled.

NURSERY BEDS.

Longitudinal Section, showing the ends of the lines of moss under the soil.



Transverse Section, showing the lines of moss.

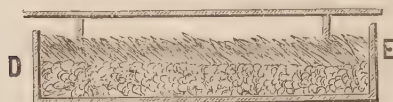


Permanently in the plantations.

Removing plants from nurseries to plantation.

25. In permanently planting out, the distance apart has been reduced from 10 and 12 feet to 6 and 7, and a modification of our former method of planting has also been found necessary. In order to facilitate this operation, the plants when removed from the nurseries, beds, or pots, are laid in a deal box in nearly a horizontal position between thin layers of moss, beginning to fill the box at D, and

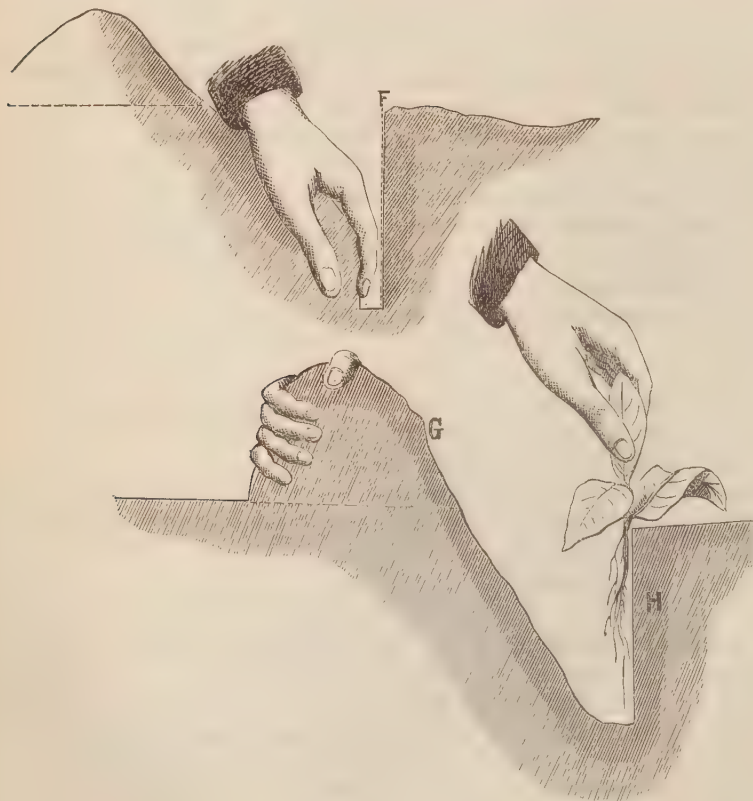
Section of box for conveyance of plants from nurseries to plantations, the covering being raised about 2 inches on cross bars to allow a free circulation of air over the tops of the plants, while it shelters them from the sun.



finishing at E; in this way from 1,000 to 2,000 plants are placed in each box, and carried by one or two men from the nursery ground to the planters, where the box is placed in the centre of the line between the planters in order that it may be conveniently moved along as the operation proceeds. The planters remove the plants one at a time beginning at E, and continue this operation until the box is emptied.

Manner in which they are planted.

26. Each plant is lifted from the box by catching the leaves between the forefinger and thumb of the left hand, while with the right hand

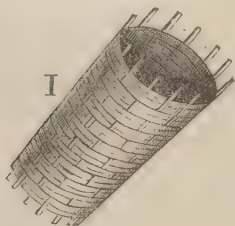


the roots are freed from any obstruction; it is then carried to the spot where intended to be planted, the right hand being thrust into the soft prepared soil in a sloping direction, and gently raising the back of the hand to the dotted line shown at F; the earth is then drawn forward as at G, leaving a straight bank behind the hand at H; the plant is now placed by the left hand against the face of the bank, the collar or top of the root being held on a level with the ground; the roots are now spread out with the right hand and the hole deepened, should the length of the roots require it; the earth from G is then brought forward with the right hand against the roots, but not pressed, and thus the operation of planting is completed; in this way a man can plant from 400 to 500 plants daily.

And shaded.

27. The young plants immediately after being planted (instead of being sheltered as formerly by a screen made of bamboo branches)

Method of shading plants.



are covered by a cylindrical basket open at both ends, 12 inches in diameter, and 14 inches long as at I, made out of the common wattles so plentiful on these hills, one man making from 8 to 10 of such baskets daily; this is found the most efficient as well as the most economical way of protecting the plants, as when they are established the baskets can be removed and are available for further use.

Usual mode of staking the plants proves to be injurious by the ties cutting into the bark.

28. It has been found that the plants when staked in the usual way are injured by the tie cutting into the bark; to remedy this, one or

two

two stakes are placed on opposite sides at a distance of about 12 inches from the plant, and a hoop formed of rattan covered with moss for large, or willow twigs for small, plants is placed around the branches and tied to the stakes at both ends, when two are used as at J. In stormy situations, and steep lands, it would appear desirable, instead of staking, to secure the plants to the ground by bending them forward and pegging them against the face of the hill; the plants would then throw up numerous shoots, and these shoots would protect each other from the force of the wind.



Adopted method of staking, by which the cutting is avoided.

29. Cultivation under living trees has been entirely abandoned, the plants having been found to suffer from the effects of the drip and want of light, while the roots of the trees in the neighbourhood penetrate the holes and draw up all the nourishment from the young plants; they are also liable to damage from the branches as well as the trees being broken and falling during storms.

Cultivation under shade of living trees, and in the open ground.

30. Partially cleared forests have also been found quite unsuited to give shelter, as the high gales of wind being caught by the tops of the trees are driven down in strong eddies, as the current from the top of one tree meets that from another, and thus twists the plants in all directions, producing much greater injury than a steady gale. In short, the more exposed the situation in which the plants are growing the more healthy and robust they appear, although they do not attain so rapid growth as in more sheltered localities, thus establishing, beyond all doubt, that the more the plant is exposed to light and air, the more perfectly it performs its functions; thus the juices being more effectually elaborated, we may expect a large proportion of alkaloid, which may counterbalance the comparative slower growth.

Partially cleared forests quite unsuited to the cultivation of the plants.

Plants fully exposed to light and air more perfectly perform their functions.

31. The large-leaved species of chinchona (red and grey barks) suffer considerably from high winds, especially when young; the leaves are frequently blown to pieces, and occasionally in very exposed situations the branches are broken, and the plants twisted out of the ground. As the plants grow older their leaves become smaller, and consequently not so much affected by the wind; the yellow and crown barks do not suffer so much from storms, their leaves being much smaller; they are, however, occasionally injured in heavy gales. The storms of hail so frequent here in March and April, although productive of temporary damage by cutting the leaves, yet the plants have not materially suffered from this cause.

Effect of storms and wet and dry weather on cultivation. Plants suffer from, when young.

As attain age, less liable to injury.

Hail storms break the leaves, but do no permanent damage.

32. During continuous wet weather, the leaves assume a yellow tint, and become contracted around the margin towards the under surface, causing rough undulations in the texture of the leaf along the midrib and between the lateral veins. It also induces a succulent and unhealthy condition of the plant, in some instances causing an unnatural development of pith, rendering the plant liable to disease, 25 plants having died from the effects of the continued rain of last season. The grey barks suffer most from the constant stream of water thrown down their channelled leaf stalks, communicating rot to the bark, which occasionally penetrates to the stem, and thus permanently injures the plant. The heavy rains have been found to carry down a large quantity of earth, which covered the plants and caused much time to be occupied in its removal; this has been effectually obviated by a system of surface drains.

Continuous wet weather, effects of.

33. As observed by early writers, "the condition of showers and sunshine" has proved most favourable for the growth and full develop-

Showers, alternated with sunshine, prove most favourable to the growth of plants.

Bear considerable drought without injury.

Ninety-eight days of continuous drought necessary to hand-water young plants.

Gathering the bark, and treatment of plants for this purpose.

Removing bark in strips injures growth of plants.

"Red," "grey," and "yellow" barks throw out shoots from the stools when cut down between March and August.

But not when cut between September and February.

"Crown" barks an exception, as they throw shoots at any season.

If cut during dry weather, plants must be prepared.

Lopping and pruning adopted, species readily produce fresh branches.

Chinchona Pitayensis, attempt to introduce.

ment of the chinchona under cultivation. The plants, however, when established, bear a considerable amount of drought without injury. During the first two months of last severe dry season the plants maintained their growth and healthy appearance, the drought then began to make itself felt, the leaves of the plants assuming by degrees the contracted form and yellow tint, as during the continuous rains. After three months continuous drought a few of the plants on the more exposed parts of the plantation began to droop; in a few days this tendency increased, and on the 98th day it became necessary to water the plants by the hand. These were plants of one year's growth, and probably plants of two years' growth in good soil would bear greater drought without injury.

34. In collecting our samples of bark, lopping the branches or cutting down the plants to within a few inches of the ground has been found the most advantageous. Removing the bark in strips from the stems of the plants has been discontinued, for although new bark is formed over the spaces, it is not until more or less decay has been communicated to the wood, and thus the stems are prevented from expanding.

35. The plants of "red," "grey," and "yellow" barks, cut down between March and August, have uniformly thrown strong shoots from the stools; these shoots have grown with great vigour, and this may be found a profitable way of treating the plants, particularly in exposed situations, as the number of shoots thrown from the stools afford mutual protection.

36. It is, however, important to note that of the plants cut down between September and February (although of the same species) not one in five threw shoots from the stools; of these plants two retained life for a few days, then gradually died away. The varieties of "crown" barks, however, form an exception, as these possess sufficient vitality to produce strong shoots at whatever season of the year they are cut.

37. From the above it is obvious that if the harvest of bark is to be obtained by cutting down the plants in the dry season, or between December and March, they must be prepared during the preceding wet weather, as described and illustrated at paragraph 21, plate VI. in "Notes on Cultivation, &c., dated March 1863."

38. When the system of lopping and pruning is adopted, all the species are found readily to produce fresh branches at any season of the year.

39. On the 4th of April 1864 I received from Mr. Markham, a small packet of seeds of *C. Pitayensis*, these were sown on the same day; a large packet received on the 20th idem, through the Government, were also sown on their receipt, and I regret to add that, up to the present date, not one seed has germinated, and fear there is now no hope of their doing so. This is much to be regretted, as the species is one of great value; and although we possess the *C. lancifolia* from Java, a Pitayo bark, yet, there being three varieties, the *lancifolia* may not be the most valuable kind; it is therefore desirable that another attempt should be made to procure fresh seeds of these plants.

40. Mr. Cross* collected the seeds in July and August 1863, and conveyed

* EXTRACTS from Mr. Cross's Letters:—

Bogota, 16 September 1863.

"There are three varieties of Pitayo Chinchona, white, yellow, and red, of which the latter is by far the finest and most valuable, having actually, in several instances, yielded 5 per cent. of sulphate of quinine. It rarely falls below 3 per cent., but its

conveyed them to Bogota, with the intention of forwarding them to Mr. Markham. By some mistake the sum which Mr. Cross was to have received for collecting the seeds had not reached Her Majesty's consul; this gave offence, and Mr. Cross returned, carrying the seeds with him into the interior of the country. After a delay of five months, and in compliance with the entreaties of Mr. Markham, the seeds were ultimately despatched, apparently after having lost their germinating powers.

41. The difficulties previously experienced in procuring efficient men has been severely felt this year, in consequence of the number of coffee and tea plantations lately opened in the neighbourhood (no less than 36 having been commenced within the last 18 months); many of our best men have left either to open plantations for themselves, or to fill situations where greater inducements are offered. Mr. Batcock, the deputy superintendent, has given great satisfaction in carrying out the work entrusted to his charge. Lieutenant Nichol recently placed in the charge of the Neddivuttum plantations, has shown energy and activity in pushing forward the operations. I have also reason to be satisfied with the diligence and care shown by Mr. Smith, assistant superintendent of the Dodabetta plantation. Overseers Burrows, Ramsey, and Wilkinson have been attentive and careful in conducting the work. In the office establishment Narrainsawmy Naidoo and Mr. McNair have given every satisfaction in the performance of their duties as pay clerk and accountant.

Establishments.

42. A range of hardening pits has been added to our propagating departments, which affords shelter for 75,000 plants, and these, with the five propagating houses described in previous reports, give ample appliances for the production of between 20,000 and 30,000 plants monthly. The total number of plants produced up to 31st May 1864 being 416,909; of this number 31,662 have been distributed to the public. Extensive nurseries have been formed on the different plantations for the accommodation of the plants produced during the current year, in all, sufficient to contain 350,000.

Progress of operations.

Propagation and nurseries.

416,909 plants propagated.

31,662 plants distributed to the public.

Nurseries formed for 350,000 young plants.

43. On the Neddivuttum plantations it has been found necessary to renew several of the temporary buildings for the coolies; the wood covering the drains and culverts formed in 1862 have been renewed and replaced by stones; the surface drains on the Denison plantations widened and increased in number, in order to prevent the severe wash occasioned by the heavy rain of last monsoon; there 220 acres are already

Neddivuttum plantations.

220 acres planted; roads, drains, &c. finished.

general yield is $3\frac{1}{2}$ to 4. This variety has been much sought for, and at the time I write it scarcely exists. It is dug up, roots and all, whenever found. After searching through mountains, ravines, and wild broken ground near Popayan, I found a splendid clump owned by an Indian, and made a clean sweep of all the seeds that were on the trees. On returning to my encampment I carefully dried the precious collection. I say precious, for neither I nor any one else can ever make a similar collection again, simply because the species will very soon be entirely annihilated. The Indian was about to dig up the roots of the clump, and when this is done the valuable species will be lost for ever. I have seen plants of this variety dug up in the surrounding forests whose stems were not thicker than a writing quill, but these are rarely to be met with, for the plant, as already stated, is nearly exterminated. On drying the collection I found I had secured nearly a million and a half, a million of which I considered to be the finest seeds I had yet collected in the Andes."

20th January 1864. "I believe the seeds to be as fresh for purposes of germination as the day they were collected on the Pitayo mountains. I send a few seeds in this letter, because I find I will not be able to get down in time for the steamer. The rest will certainly come by the following mail. The seeds were well ripened, carefully dried, and have been carefully protected up to the present time. Give the seeds on the Neilgherries about the same temperature as the Loxa seeds until they germinate. Then treat them as hardy as possible. Care must be taken that this species does not get overloaded at the roots with moisture. It is the most rapid growing of all the Chinchonas, and perhaps the best."

(signed) Clements R. Markham.

205 additional acres cleared, and in a forward state of preparation for planting.

already planted; roads, drains, trenches, &c., finished; on the first Denison plantation the plants have attained considerable size, and promise to rise rapidly into a luxuriant forest. On the Markham plantation the plants have only recently been planted, and are necessarily small; 205 additional acres have also been cleared, and are in a forward state of preparation for planting; the earthwork of the roads and bridges completed, though here and there interrupted by rocks, which are being removed; the propagating house on this plantation has been extended, and affords sufficient space for 20,000 cuttings.

Wood plantation at Pykara works made less progress.

44. On the Wood plantation at Pykara the work has not made such satisfactory progress, owing to the difficulty in obtaining an efficient assistant. Here, however, 165 acres of land have been more or less prepared, of which eight acres only have been planted. The permanent buildings finished, and comfortable lines for coolies erected.

165 acres more or less prepared.
8 acres only planted.

Dodabetta plantations, 95 acres planted.
And commenced on 60 additional acres.

45. On the Dodabetta plantations the work has progressed satisfactorily, 95 acres being planted, and 60 additional acres in progress; here upwards of 500 acres have been inclosed with a trench, and 11,000 yards of road cut intersecting this extent of land, the object in cutting these roads prior to planting being to facilitate the removal of the firewood, and thus increase its market value. The wood has realised 5,050 rupees, and paid to the credit of the Forest Department.

Total extent of 500 acres enclosed by a trench.

New plantation on Koondahs.

46. In opening the new plantation on the Koondahs, great difficulty has been experienced in pushing forward the operations, owing to the want of roads; here 160 acres have been felled, of this 75 acres have been lopped and burned, and is at present in course of preparation for planting; cooly lines and other temporary buildings have been completed, and a contract entered into for making the road, I therefore trust shortly to be able to procure sufficient labour to complete the permanent buildings.

160 acres felled.

75 lopped and burned.

Temporary buildings finished.

Botanical Gardens.

47. In the Botanical Gardens the prevailing scarcity of labour has been much felt, especially towards the end of the year, notwithstanding considerable improvement has lately been effected. Between the upper and lower gardens an ornamental piece of water has been formed, enclosed by a revetment wall raised so as to form a parapet to the adjoining terrace; this terrace is in the form of a crescent, and is now being laid out into parterre, with a band-stand in the centre, and three fountains on each side. In the upper portion of the garden three fountains have been erected, and are working well; here also parterres and ornamental vases have been introduced, and the whole made as attractive as possible by planting with choicest flowers and shrubs. In the lower garden a labyrinth has been formed on the plan of that at Hampton Court, the hedges of *Rose floire de Rosamere* and *Blairü*; here also an ornamental piece of water has been added; in this portion of the garden the plants suffer much from the attacks of the grubs of the cockchafee, rendering it difficult to secure that luxuriance of vegetation which prevails in the upper garden.

Improvements effected.

Plants introduced.

48. During the year many valuable plants have been added to our collection. To his Excellency Sir William Denison, Governor of Madras, we are indebted for the very valuable *Araucarias Bidnellii* and *Cookii*, the beautiful *Clianthus Dampierii*, twelve varieties of Australian grapes, and numerous seeds of valuable timber trees, as *encalypti*, *acacias*, &c., and to Mr. Lascelles for the *Cupressus Macrocarpa*, *Dammara Brownii*, and a few species of unnamed Japan conifera. From Dr. Anderson, of the Calcutta Botanical Gardens, *Podocarpus longifolia*; to Messrs. E. B. Thomas and E. Thomas, for a collection of European fruit trees and shrubs; to Mr. J. D. Sim, for *Amherstia Nobilis*, *Stigmaphyllon Ciliatum*, *Meyenia erecta*, and the white variety of

of *Lagestria indica*; to Major Hutton, for four fine varieties of fuchsia and a few British forest trees; to Mrs. Arbuthnot, for numerous ornamental plants, and to Dr. Birdwood, of Bombay, for *Strelitzia angustifolia*.

The following Table exhibits the distribution of garden plants, seeds, &c. for 1863-64 : Distribution.

Months.	Fruit Trees and Shrubs.	Timber Trees.	Shrubs and Flowers.	Collections of Seeds.	Amount.
1863.					<i>Rs. a. p.</i>
May - - - -	- - -	74	- - -	19	186 4 -
June - - - -	53	10	38	17	139 - -
July - - - -	77	56	138	23	248 1 -
August - - -	86	33	58	33	246 1 6
September - -	44	47	134	34	217 15 6
October - - -	168	5	250	15	288 3 6
November - - -	6	22	202	17	138 4 -
December - - -	- - -	122	165	12	117 - -
1864.					
January - - -	- - -	-	- - -	1	1 14 -
February - - -	- - -	-	3	2	3 10 -
March - - - -	- - -	-	9	11	45 14 -
April - - - -	50	245	343	2	152 2 -
TOTAL Distribution -	484	614	1,340	186	1,784 5 6

49. From the above observations it will be observed that during the past official year we have made great progress, still the scarcity of labour has been severely felt, rendering it difficult to perform the different operations at the proper seasons. In conclusion, I beg to tender my grateful acknowledgments to his Excellency Sir William Denison, Governor of Madras, for the liberality with which he has met every suggestion tending to facilitate the progress of this important undertaking. To Mr. Markham, of the India Office, my best thanks are due for much valuable assistance, and the deep interest he has evinced in the progress of the Chinchona plantations; also to Mr. Howard, for the very important information he has so liberally furnished on the formation of alkaloid in the bark. Concluding remarks.

(signed) G. W. McIvor,
Supt. Govt. Chinchona Plantations.

Ootacamund, 7 July 1864.

(B.)—METEOROLOGICAL OBSERVATIONS from 1st May 1863 to 30th April 1864, made on the Government Chinchona Plantation at Neddivuttum.

MONTH.	Mean Monthly Temperature.	Mean Daily Range.	Maximum observed during the Month.	Rainfall.	Days without Rain.	Days with Rain.
1863 :	°	°	°	<i>Inches.</i>		
July - - -	62·5	12·6	76·0	15·46	5	26
August - - -	64·6	16·3	74·0	23·77	9	22
September - - -	66·5	15·6	80·0	5·59	9	21
October - - -	66·0	17·3	82·0	10·47	14	17
November - - -	70·0	23·0	89·0	0·50	26	4
December - - -	80·4	27·0	92·0	1·95	26	5
1864 :						
January - - -	65·7	28·0	85·0	0·52	30	1
February - - -	69·6	28·0	87·0	-	29	-
March - - -	72·1	29·4	90·0	0·38	29	2
April - - -	71·4	22·5	99·0	2·80½	18	12
ANNUAL - - -	68·8	21·9	84·5	61·44½	196	110

The readings in this Table are high, in consequence of the sun occasionally striking on the board upon which the thermometers were placed.

Ootacamund, 7 July 1864.

(signed) *W. G. McIvor*,
Superintendent, Government Chinchona Plantations.

(C.)—METEOROLOGICAL OBSERVATIONS from 1st May 1863 to 30th April 1864, made at the Government Gardens, Ootacamund.

MONTH.	Monthly Mean of Dry Bulb Thermometer.	Monthly Mean of Wet Bulb Thermometer.	Due Point of Monthly Means.	Maximum observed during the Month.	Greatest Daily Range.	Rainfall.	Days without Rain.	Days with Rain.
1863 :	°	°	°	°	°	<i>Inches.</i>		
May - - -	62·5	60·8	59	78	23	5·98	13	18
June - - -	58·7	58·0	58	73	18	3·99	14	16
July - - -	57·8	56·7	56	72	18	1·49	16	15
August - - -	59·1	58·5	56	71	17	3·58	16	15
September - - -	58·9	57·6	56	72	24	2·16	14	16
October - - -	58·1	* 57·1	56	72	23	8·45	14	17*
November - - -	56·4	54·8	53	70	22	1·86	22	8
December - - -	56·3	53·2	51	71	26	2·38	24	7
1864 :								
January - - -	55·0	51·0	47	73	31	-	31	-
February - - -	58·0	52·0	48	76	28	-	29	-
March - - -	62·0	55·0	50	80	30	0·8	30	1
April - - -	59·0	57·0	56	77	26	3·18	13	17
ANNUAL - - {	Mean, 58·5	Mean, 55·9	Mean, 53·8	Mean, 73·7	Mean, 23·8	Total, 38·17	Total, 236	Total, 130

South-west monsoon commenced on the 31st of May 1863.

* On the 26th October 1863, and two following days, rain most excessive, and gauge overflowed. A calculation from a quarter of an hour's reading on the morning of the 20th, gave 4 inches, 56 cents. as the rain of the preceding night, which was probably below the correct amount. This amount is omitted in the monthly total.

Ootacamund, 7 July 1864.

(signed) *W. G. McIvor*,
Superintendent, Government Chinchona Plantations.

— No. 42. —

ORDER of the Madras Government, 9 February 1865.

1. The Governor in Council considers the foregoing report of the progress of the Chinchona plantations during the official year 1863-64, to be extremely satisfactory. The season was an unusually trying one, the drought being so long continued that it became necessary to resort to watering by the hand, yet the plants made good progress.

2. The propagation has been more successful than in previous years, the monthly average having been 15,326 plants, and the maximum, in February 1864, 32,408. The total number of plants produced up to the 31st May 1864 has been 416,909, of which 31,662 have been distributed to the public.

3. The extent actually planted out in the different Government plantations is stated to be 323 acres.

4. The first plants were permanently planted out at Neddivuttum in August 1862, and have, in the 20 months which have since elapsed, "attained heights varying from six to nine feet, with thick stems, well furnished with lateral branches, and presenting as robust and healthy an appearance as could be wished." This growth is said to be about three inches in excess of the average of the same species (*C. succirubra*) throughout the plantations.

5. The result of the year's analysis of the bark is also highly encouraging, the yield of rough alkaloids having been six per cent., while in the previous year it was only 4·3.

6. There can no longer be room for doubt as to the successful introduction of the Chinchona on the Neilgherries, and the extraordinary success which has attended its culture, whether regard be had to extensive propagation, rapid and healthy growth, or the rich production of alkaloids.

7. For these results the Government are indebted to Mr. M'Ivor, whose able and zealous exertions in this important enterprise merit the highest

8. The total expenditure up to the 30th April 1864 has amounted to 1,36,343 rupees, under the following heads :—

	<i>Rs.</i>
Buildings - - - - -	21,188
Plantations - - - - -	58,388
Tools - - - - -	5,029
Establishment - - - - -	47,982
Contingencies - - - - -	3,756

9. The progress of the different plantations appears to be as follows :—

At Neddivuttum 220 acres have been planted out, with roads, drains, &c., completed ; 205 acres are in a forward state of preparation for planting, and the earth-work of the roads and bridges completed. The propagating house has been extended, and afford space for 20,000 cuttings.

At Pykara eight acres have been planted out, and 165 more or less prepared ; the permanent buildings and cooly lines have been finished.

At Dodabetta 95 acres have been planted ; 60 acres are in progress ; 500 acres have been enclosed with a trench, and 11,000 yards of road cut.

At the Koondahs (sanctioned only in December 1863) 75 acres have been lopped and burned, and are in course of preparation for planting ; 85 acres have been felled, and cooly lines and temporary buildings erected.

A range of hardening pits, affording shelter for 75,000 plants, has been added to the propagating houses, and there are thus ample means for producing from
20,000

20,000 to 30,000 plants monthly. Extensive nurseries have also been formed on the different plantations.

10. This is a very satisfactory state of affairs.

11. The failure of the seeds of *C. Pitayensis* is much to be regretted, and will be brought to the notice of the Home Government, that efforts may be made to procure a further supply.

12. The paragraphs marginally noted contain much valuable information as to the culture, &c., of the Chinchona, and will be separately printed uniformly with the manual to which they will be added. Paragraphs 9 to 13.
Paragraphs 24 to 38.

13. The Government have already issued orders for the preparation of a list of reserved lands, so that intending planters may have the means of readily ascertaining what lands are and are not available. The impression, which is said to prevail, that no more forest land will be sold, is altogether without foundation; the extreme difficulty of obtaining competent surveyors, and the necessity which the law imposes, of advertising all lots for three months, necessarily cause delay in the transfer of land; but the Government are not aware of applications having been refused, on the plea of the land being reserved, so frequently as to afford ground for the impression stated. The collector will report how many cases of refusal on this account have occurred during the last year. In order to avoid delay, the Government, it may be remarked, now allow lands to be sold prior to actual survey on condition of the boundaries being carefully and permanently marked, and the purchase being subject to adjustment on the survey.

14. The Government do not deem it necessary here to discuss the subject of paragraphs 17 to 23 of Mr. M'Ivor's report. They will merely observe that Mr. M'Ivor's views are not those in general acceptance.

15. Mr. M'Ivor's account of the botanical gardens is highly satisfactory. The Government consider it desirable that he should now prepare for publication a catalogue of the different trees, shrubs, &c. in the gardens.

16. In future reports the progress of the tea plantation and nurseries of Australian trees should be specially noticed. The Government wish attention paid to the latter, and will continue to supply Mr. M'Ivor with seeds from Australia. The plants when grown can be sold to the public at a fair price, and furnished to the forest department for the Government sholas. The commoner kinds of Australian trees, as the *Acacia Melanoxylon*, need not of course be raised by Mr. M'Ivor.

17. The Government note with satisfaction the testimony borne by Mr. M'Ivor to the services of Mr. Batcock, Lieutenant Nichol, Mr. Smith, and overseers Burrows, Ramsay, and Wilkinson, and of his office assistants Nairainsawmy Naidoo and Mr. M'Nair.

(True Extract.)

(signed) *A. J. Arbuthnot*, Chief Secretary.

— No. 43. —

From the Government of *Madras* to the Secretary of State for India.

Madras, 4 April 1865.

WE have the honour to forward, for your information, the accompanying Tabular Report on the number, condition, &c. of the Chinchona plants on the Neilgherries, on the 28th February 1865.

Enclosure in No. 43.

REPORT on the Number, Distribution, and Condition of Chinchona Plants on the Neilgherries, on the 28th February 1865.

No. of Species.	Botanical Names.	Commercial Names.	Number of Plants.	Value per Lb. of Dry Bark in the London Market.	REMARKS.
				<i>s. d.</i> <i>s. d.</i>	
1	<i>C. succirubra</i> - -	Red Bark - -	152,964	2 6 to 8 9	The number of plants permanently planted out in the plantations remain the same as last month, namely, 165,351.
2	<i>C. Calisaya</i> - -	Yellow Bark - -	2,651	2 10 to 7 -	
3	<i>C. officinalis</i> , var. <i>Condaminea</i> (<i>C. Uritus-singa</i>).	Original Loxa Bark	3,114	2 10 to 7 -	
4	<i>C. officinalis</i> , var. <i>Bonplandiana</i> (<i>C. Chahuarguera</i>).	Select Crown Bark -	348,572	2 10 to 7 -	The increase by propagation is 23,419, being 3,807 plants above the average of the last six months making the total number of plants at the end of the month, 539,602.
5	<i>C. crespilla</i> - -	Fine Crown Bark -	2,563	2 10 to 6 -	
6	<i>C. lancifolia</i> - -	Pitayo Bark - -	30	1 8 to 2 10	
7	<i>C. nitida</i> - -	Genuine Grey Bark	2,786	1 8 to 2 9	
8	<i>C. Species</i> without name.	Fine Grey Bark -	8,500	1 8 to 2 10	
9	<i>C. micrantha</i> - -	Grey Bark - -	14,608	1 8 to 2 9	
10	<i>C. Peruviana</i> - -	Finest Grey Bark -	3,389	1 8 to 2 10	
11	<i>C. Pahudiana</i> - -	Unknown - -	425	Worthless.	
TOTAL Number of Plants - - -			539,602		

TABLE II.

MEMORANDUM of the Growth of Eleven Plants of *C. succirubra*, planted in the Second Denison Plantation, at Neddivuttum, on the 30th August 1862.

Number of Plants.	Height in Inches when Planted on the 30th August 1862.	Height in Inches on the 31st January 1865.	Height in Inches on the 28th February 1865.	Growth in Inches during February 1865.	By Whom Planted.
1	23	113½	114	¾	His Excellency Sir W. Denison.
2	16½	102	102½	¾	
3	19	105½	106	¾	
4	15	99	99½	¾	
5	27	117½	118	¾	
6	20	90	91	1	J. W. Breeks, Esq.
7	20	108	109	1	
8	18	109½	110	½	
9	20	112	113	1	J. D. Sim, Esq.
10	20	114	114½	½	Lieutenant McLeod.
11	18	98½	99	½	P. Grant, Esq.
12	-	53½	55	1½	Plant cut down for bark.

TABLE II. exhibits the growth of 11 plants of *Chinchona succirubra* planted out by his Excellency the Governor and other gentlemen, at Neddivuttum, on the 30th August 1862. The average growth of these plants during the month, is ¾th of an inch, being ½th of an inch below the growth of last month.

One of the two plants cut down on the 20th of March 1863 for the bark, submitted to Mr. Howard for analysis, has made strong shoots of 55 inches in height, giving the growth of 1½ inch during the month.

The 12 plants of *C. officinalis* (a shrubby species), on the Dodabetta plantation, gives an average growth of 1½th inch, or ¾th of an inch under the growth of last month.

The number of plants issued to the public is 500, making the total number of plants distributed 52,857.

TABLE III.

Showing the Height of 12 Plants of *C. officinalis*, planted on the Dodabetta Plantation at Ootacamund on the 30th September 1863.

Number of Plants.	Height in Inches when Planted on the 30th September 1863.	Height in Inches on the 31st January 1865.	Height in Inches on the 28th February 1865.	Growth in Inches during February 1865.	REMARKS.
1	19	70	72	2	
2	14½	61½	64	2½	
3	28	75	76	1	
4	22	78½	79	½	
5	21½	71½	75	3½	
6	28	79	82½	3½	
7	22½	71	73	2	
8	21½	71	72	1	
9	21½	78	80	2	
10	19½	73	73	—	
11	24	75	76	1	
12	24	74	77	3	

TABLE IV.

REGISTER of Chinchona Plants distributed.

NAMES.	STATIONS.	Number of Plants.
Mr. F. N. Maltby - - -	Travancore - - -	16
Dr. Junghuhn - - -	Java - - -	56
Mr. A. R. Lascelles - - -	Ootacamund - - -	12
Mr. M. Anderson - - -	Jamaica - - -	2
Dr. Wiche - - -	Bombay - - -	10
Dr. T. Anderson - - -	Calcutta - - -	554
Dr. Jamieson - - -	Saharanpore - - -	107
Professor Lees - - -	Calcutta - - -	547
Rajah of Travancore - - -	Travancore - - -	521
Major Morgan - - -	Ootacamund - - -	1,534
Mr. E. T. Fitzgerald - - -	Calcutta - - -	558
Mr. J. W. B. Money - - -	ditto - - -	1,339
Dr. W. Bourne - - -	ditto - - -	532
Captain Cox - - -	Wynad - - -	6
Mr. Hollock - - -	ditto - - -	2
Mr. T. Sheffield - - -	Ootacamund - - -	12
Dr. F. Day - - -	Cochin - - -	100
Mr. Brown - - -	Tellicherry - - -	12
Mr. J. Hall - - -	Ootacamund - - -	144
Mr. J. Knop - - -	ditto - - -	18
Captain Lees - - -	Bengal - - -	281
Mr. W. H. Rayne - - -	Manantoddy - - -	424
Rev. — Sawyer - - -	Ootacamund - - -	1,018
Mr. A. Frend - - -	ditto - - -	112
Mr. Hollock - - -	ditto - - -	1
Mr. J. Pierie - - -	Seegoor - - -	12
Colonel Scott - - -	Ootacamund - - -	1,226
Mr. Berend - - -	Cachar - - -	275
Rev. J. Hunter - - -	Coonoor - - -	12
Mr. W. H. Stanes - - -	ditto - - -	1,262
Colonel R. Cooper - - -	ditto - - -	12
Mr. F. Cockburn - - -	Kotagherry - - -	12
Mr. J. Mullaly - - -	Coonoor - - -	24
Colonel Woodfall - - -	ditto - - -	12
Mr. C. Anderson - - -	ditto - - -	24
Colonel Angelo - - -	ditto - - -	12
Rev. E. Laseron - - -	Ootacamund - - -	12
Captain R. N. Taylor - - -	ditto - - -	96
Major W. Agnew - - -	Coorg - - -	139
Mr. V. H. Levinge - - -	Madura - - -	12
Chief Commissioner of - - -	Assam - - -	28
Mr. Fletcher - - -	Nagpore - - -	24
Gool Mahomed - - -	Ootacamund - - -	20

TABLE IV.—Register of Chinchona Plants distributed—*continued*.

NAMES.	STATION.	Number of Plants.	REMARKS.
General M'Cleverty - - -	New Zealand - -	23	
Mr. W. Robinson - - -	Kotagherry - -	30	
Mr. Crake - - -	Wynad - -	12	
Mr. H. R. Dawson - - -	Seegoor - -	12	
Captain Mann - - -	Coorg - -	48	
Mr. E. Roberts - - -	ditto - -	530	
Mr. H. Russell - - -	Wynad - -	12	
Reverend Wait - - -	Coonoor - -	2	
Collector of Belgaum - - -	Belgaum - -	28	
Collector of Honore - - -	Honore - -	28	
Dr. Ross - - -	ditto - -	15	
His Excellency the Governor - -	Bombay - -	158	
Mr. H. Hinde - - -	Wynad - -	12	
Mr. E. B. Thomas - - -	Coonoor - -	12	
Rajah of Poonganoor - - -	Poonganoor - -	12	
Major Grant - - -	Wellington - -	226	
Messrs. Thomas Shaw & Co - -	Poonganoor - -	28	
Mr. J. H. Trinson - - -	ditto - -	31	
Dr. Muller - - -	Melbourne - -	28	
Mr. Tyrrell - - -	Mysore - -	12	
Dr. Sayers - - -	Vellore - -	12	
Major C. P. Taylor - - -	Ootacamund - -	5,250	
Doctor Wilson - - -	ditto - -	6	
Mr. Schnarrie - - -	ditto - -	15,000	
Captain Fuller - - -	Coonoor - -	266	
Mr. Drummond - - -	Ootacamund - -	224	
Captain Jennings - - -	ditto - -	1,756	
Lieut. H. B. Montmorency - -	Bangalore - -	6	
Mr. M'Hutchin - - -	Ootacamund - -	3	
Colonel Molesworth - - -	ditto - -	6	
Mr. C. Gray - - -	Coonoor - -	12	
Mr. H. B. Leddell - - -	Ootacamund - -	12	
Mr. Minchin - - -	Wynad - -	1,600	
His Excellency the Governor - -	Vizagapatam - -	35	
Mr. R. F. Phillips - - -	Kotagherry - -	1,117	
Colonel Cooke - - -	ditto - -	24	
Mr. G. J. Glasson - - -	Wynad - -	1,000	
Dr. Macpherson - - -	Mercara - -	400	
Mr. W. H. Kerr - - -	Coorg - -	3,100	
Mr. James - - -	Ootacamund - -	1,000	
Colonel Whish - - -	Bengal - -	82	
Mr. K. Mair - - -	Calcutta - -	1,180	
Mr. W. Shakespear - - -	ditto - -	61	
Mr. E. E. Meakin - - -	ditto - -	168	
Mr. C. Acland - - -	ditto - -	150	
Mr. K. M'Iver - - -	ditto - -	124	
Mr. Havelock - - -	Ootacamund - -	12	
Mr. H. de Facien - - -	Kartairy - -	6,821	
Major Sweet - - -	ditto - -	102	
Captain Campbell - - -	Bangalore - -	6	
Royal Gardens - - -	Mauritius - -	36	
Honourable W. R. Arbuthnot - -	Wynad - -	93	
Mr. H. Maxwell - - -	Bombay - -	50	
Mrs. C. Smith - - -	Wynad - -	22	
Captain Beckley - - -	Wellington - -	200	
Mr. A. Friend - - -	Ootacamund - -	400	
Mr. Walsh - - -	Salem - -	100	
TOTAL Number of Plants - - -		52,857	

Ootacamund,
15 March 1865.

(signed) W. G. M'Ivor,
Superintendent, Government Chinchona Plantations.

— No. 44. —

From the Government of Madras to the Secretary of State for India.

Madras, 13 April 1865.

WE have the honour to forward for your information the accompanying Tabular Report on the number, condition, &c. of the Chinchona plants on the Neilgherries on the 31st March 1865.

Enclosure in No. 44.

REPORT on the Number, Distribution, and Condition of Chinchona Plants on the Neilgherries, on the 31st March 1865.

No. of Species.	Botanical Names.	Commercial Names.	Number of Plants.	Value per Lb. of Dry Bark in the London Market.	REMARKS.
1	<i>C. succirubra</i> - -	Red Bark - -	161,273	<i>s. d.</i> <i>s. d.</i> 2 6 to 8 9	The number of plants permanently planted out in the plantations remain the same as last month, namely, 165,351.
2	<i>C. Calisaya</i> - -	Yellow Bark - -	2,711	2 10 to 7 -	
3	<i>C. officinalis</i> var. <i>Condaminea</i> (<i>C. Uritus-singa</i>).	Original Loxa Bark -	3,483	2 10 to 7 -	
4	<i>C. officinalis</i> var. <i>Bonplandiana</i> (<i>C. Chahuarguenera</i>).	Select Crown Bark -	356,072	2 10 to 7 -	The increase by propagation is 16,900, being 3,544 plants under the average of the last six months, making the total number of plants at the end of the month 555,922.
5	<i>C. crespilla</i> - -	Fine Crown Bark -	2,579	2 10 to 6 -	
6	<i>C. lancifolia</i> - -	Pitayo Bark - -	38	1 8 to 2 10	
7	<i>C. nitida</i> - -	Genuine Grey Bark -	2,786	1 8 to 2 9	
8	<i>C. Species</i> without name.	Fine Grey Bark -	8,500	1 8 to 2 10	
9	<i>C. micrantha</i> - -	Grey Bark - -	14,666	1 8 to 2 9	
10	<i>C. Peruviana</i> - -	Finest Grey Bark -	3,389	1 8 to 2 10	
11	<i>C. Pahudiana</i> - -	Unknown - -	425	Worthless.	
TOTAL Number of Plants - - -			555,922		

TABLE II.

MEMORANDUM of the Growth of Eleven Plants of *C. succirubra*, planted on the Second Denison Plantation, at Neddivuttum, on the 30th August 1862.

Number of Plants.	Height in Inches when Planted on the 30th August 1862.	Height in Inches on the 28th February 1865.	Height in Inches on the 31st March 1865.	Growth in Inches during March 1865.	By whom Planted.
1	23	114	115	1	His Excellency Sir William Denison.
2	16½	102½	102½	½	
3	19	106	106	-	
4	15	99½	100	½	
5	27	118	118	-	
6	20	91	91½	½	J. W. Brecks, Esq.
7	20	109	109	-	
8	18	110	110½	½	Dr. Sanderson.
9	20	113	114	1	J. D. Sim, Esq.
10	20	114½	114½	-	Lieutenant M'Leod.
11	18	99	99½	½	P. Grant, Esq.
12	-	55	55	-	Plant cut down for bark.

TABLE II. exhibits the growth of eleven plants of *Chinchona succirubra* planted out by His Excellency the Governor, and other gentlemen, at Neddivuttum, on the 30th August 1862. The average growth of these plants during the month is $\frac{4}{11}$ ths of an inch, being $\frac{3}{11}$ ths of an inch under the growth of last month.

One of the two plants cut down on the 20th of March 1863 for the bark submitted to Mr. Howard for analysis, has made strong shoots of 55 inches in height, but has not increased in height during the current month.

TABLE III.

SHOWING the Height of Twelve Plants of *C. officinalis*, planted on the Dodabetta Plantation at Ootacamund, on the 30th September 1863.

Number of Plants.	Height in Inches when Planted on the 30th September 1863.	Height in Inches on the 28th February 1865.	Height in Inches on the 31st March 1865.	Growth in Inches during March 1865.	REMARKS.
1	19	72	74	2	The twelve plants of <i>Chinchona officinalis</i> (a shrubby species) on the Dodabetta Plantation gives an average growth of $2\frac{1}{2}$ inches, or 1 inch above the growth of last month.
2	$14\frac{1}{2}$	64	68	4	
3	28	76	$78\frac{1}{2}$	$2\frac{1}{2}$	
4	22	79	$80\frac{1}{2}$	$1\frac{1}{2}$	
5	$21\frac{1}{2}$	75	$76\frac{1}{2}$	$1\frac{1}{2}$	
6	28	$82\frac{1}{2}$	86	$3\frac{1}{2}$	
7	$22\frac{1}{2}$	73	76	3	
8	$21\frac{1}{2}$	72	74	2	
9	$21\frac{1}{2}$	80	81	1	
10	$19\frac{1}{2}$	73	74	1	
11	24	76	78	2	
12	24	77	79	2	

TABLE IV.

REGISTER of *Chinchona* Plants Distributed.

NAMES.	STATION.	Number of Plants.
Mr. F. N. Maltby - - - -	Travancore - - - -	16
Dr. Junghuhn - - - -	Java - - - -	56
Mr. A. R. Lascelles - - - -	Ootacamund - - - -	12
Mr. M. Anderson - - - -	Jamaica - - - -	2
Dr. Wiche - - - -	Bombay - - - -	10
Dr. T. Anderson - - - -	Calcutta - - - -	554
Dr. Jamieson - - - -	Saharanpore - - - -	107
Professor Lees - - - -	Calcutta - - - -	547
Rajah of Travancore - - - -	Travancore - - - -	521
Major Morgan - - - -	Ootacamund - - - -	1,534
Mr. E. T. Fitzgerald - - - -	Calcutta - - - -	558
Mr. J. W. B. Money - - - -	- ditto - - - -	1,369
Dr. W. Bourne - - - -	- ditto - - - -	532
Captain Cox - - - -	Wynad - - - -	6
Mr. Hollock - - - -	- ditto - - - -	2
Mr. T. Sheffield - - - -	Ootacamund - - - -	12
Dr. F. Day - - - -	Cochin - - - -	100
Mr. Brown - - - -	Tellicherry - - - -	12
Mr. J. Hall - - - -	Ootacamund - - - -	144
Mr. J. Knop - - - -	- ditto - - - -	18
Captain Lees - - - -	Bengal - - - -	281
Mr. W. H. Rayne - - - -	Manantoddy - - - -	424
Rev. — Sawyer - - - -	Ootacamund - - - -	1,018
Mr. Frend - - - -	- ditto - - - -	512
Mr. Hollock - - - -	- ditto - - - -	1
Mr. J. Pierie - - - -	Seegoor - - - -	12
Colonel Scott - - - -	Ootacamund - - - -	1,226
Mr. Berend - - - -	Cachar - - - -	275
Reverend J. Hunter - - - -	Coonoor - - - -	12
Mr. J. Mullaly - - - -	- ditto - - - -	24
Mr. W. H. Stanes - - - -	- ditto - - - -	1,262
Colonel R. Cooper - - - -	Kotagherry - - - -	12
Mr. F. Cockburn - - - -	- ditto - - - -	12
Colonel Woodfall - - - -	Coonoor - - - -	12
Mr. C. Anderson - - - -	- ditto - - - -	24
Colonel Angelo - - - -	Ootacamund - - - -	12
Reverend E. Laseron - - - -	- ditto - - - -	12
Captain R. N. Taylor - - - -	Coorg - - - -	96
Major W. Agnew - - - -	Assam - - - -	139
Mr. V. H. Levinge - - - -	Madura - - - -	12
Chief Commissioner of - - - -	Nagpore - - - -	28
Mr. Fletcher - - - -	Ootacamund - - - -	24
Gool Mahomed - - - -	- ditto - - - -	20

The number of plants issued to the public during this month is 580, making the total number of plants distributed 53,437.

TABLE IV.—REGISTER of Chinchona Plants Distributed—*continued*.

NAMES.	STATION.	Number of Plants.	REMARKS.
General McCleverty - - -	New Zealand - - -	23	
Mr. W. Robinson - - -	Kotagherry - - -	30	
„ Crake - - -	Wynad - - -	12	
„ H. R. Dawson - - -	Seegoor - - -	12	
Captain Mann - - -	Coorg - - -	48	
Mr. E. Roberts - - -	- ditto - - -	530	
„ H. Russell - - -	Wynad - - -	12	
Rev. — Wait - - -	Coonoor - - -	2	
Collector of Belgaum - - -	Belgaum - - -	28	
Collector of Honore - - -	Honore - - -	28	
Dr. Ross - - -	- ditto - - -	15	
His Excellency the Governor -	Bombay - - -	158	
Mr. H. Hinde - - -	Wynad - - -	12	
„ E. B. Thomas - - -	Coonoor - - -	12	
Rajah of Poonganoor - - -	Poonganoor - - -	12	
Major Grant - - -	Wellington - - -	226	
Messrs. Thomson, Shaw & Co. -	Poonganoor - - -	28	
Mr. J. H. Trinson - - -	- ditto - - -	31	
Dr. Muller - - -	Melbourne - - -	28	
Mr. Tyrrell - - -	Mysore - - -	12	
Dr. Sayers - - -	Vellore - - -	12	
Major C. P. Taylor - - -	Ootacamund - - -	5,250	
Doctor Wilson - - -	- ditto - - -	6	
Mr. Schnarrie - - -	- ditto - - -	15,000	
Captain Fuller - - -	Coonoor - - -	266	
Mr. Drummond - - -	Ootacamund - - -	224	
Captain Jennings - - -	- ditto - - -	1,756	
Lieutenant H. B. Montmorency -	Bangalore - - -	6	
Mr. McHutchin - - -	Ootacamund - - -	3	
Colonel Molesworth - - -	- ditto - - -	6	
Mr. C. Gray - - -	Coonoor - - -	12	
„ H. B. Leddell - - -	Ootacamund - - -	12	
„ Minchin - - -	Wynad - - -	1,600	
His Excellency the Governor -	Vizagapatam - - -	35	
Mr. R. F. Phillips - - -	Kotagherry - - -	1,117	
Colonel Cooke - - -	- ditto - - -	24	
Mr. G. J. Glasson - - -	Wynad - - -	1,000	
Dr. Macpherson - - -	Mercara - - -	400	
Mr. W. H. Kerr - - -	Coorg - - -	3,100	
„ James - - -	Ootacamund - - -	1,000	
Colonel Whish - - -	Bengal - - -	82	
Mr. K. Mair - - -	Calcutta - - -	1,180	
„ W. Shakespear - - -	- ditto - - -	61	
„ E. E. Meakin - - -	- ditto - - -	168	
„ C. Ackland - - -	- ditto - - -	150	
„ K. McIver - - -	- ditto - - -	124	
„ Havelock - - -	Ootacamund - - -	12	
„ H. de Facien - - -	Kartairy - - -	6,821	
Major Sweet - - -	- ditto - - -	102	
Captain Campbell - - -	Bangalore - - -	6	
Royal Gardens - - -	Mauritius - - -	36	
Honourable W. R. Arbuthnot -	Wynad - - -	93	
Mr. H. Maxwell - - -	Bombay - - -	50	
Mrs. C. Smith - - -	Wynad - - -	22	
Captain Beckley - - -	Wellington - - -	200	
Mr. Walsh - - -	Salem - - -	100	
His Excellency the Governor General	Java - - -	175	
Captain Richardson - - -	Kulhuty - - -	381	
Rajah of Poonganoor - - -	Poonganoor - - -	24	
TOTAL Number of Plants - - -		53,437	

Ootacamund,
7 April 1865.

(signed) *W. G. McIvor*,
Superintendent Government Chinchona Plantations.

— No. 45. —

From the Governor of Madras to the Secretary of State for India.

Madras, 11 May 1865.

WE have the honour to advise you of the transmission by this mail of a further supply of Chinchona bark to be submitted to Mr. Howard for analysis and report. Enclosed is a memorandum of the bark, together with a letter from the superintendent on the subject.

Enclosure in No. 45.

From *W. G. McIvor*, Esq., Superintendent, Government Chinchona Plantations, Ootacamund, to *C. G. Master*, Esq., Secretary to Government, Revenue Department.

Sir,

Ootacamund, 3 May 1865.

1. I HAVE the honour to forward, by banghy, a box containing a further supply of Chinchona bark, as per memorandum annexed, for transmission to the Right Honourable the Secretary of State for India, in order that they may be submitted to Mr. Howard for analysis and report.

2. The bark now forwarded was removed from the plants in the early part of April last, or as the sap begins to rise, as at this season the bark separates freely from the wood.

3. Specimens Nos. 2 and 3 are renewed barks; these attain extraordinary thick ness in a short period of growth; and if they contain a proportionate quantity of alkaloids, this system of treating the plants appears to offer greater advantages than the other methods proposed.

4. I may observe that further observation seems to establish that this system of removing strips of bark from the stems of the plants can be practised without injury, provided the wound is instantly covered with damp moss; inattention to covering the wounds having produced the bad effects detailed in my letter of the 17th March 1864.*

* Vide Despatch to Secretary of State, 23 March 1865. No. 25 Misc.

MEMORANDUM.

Chinchona succirubra.

No. 1. Bark of three years and five months' growth, thickened by the application of moss.

No. 2. Renewed bark of one year and five months' growth, being re-produced on the same portion of a stem, which produced the bark given to Dr. de Vriÿ in November 1863, and from which that gentleman obtained 8.409 per cent. of alkaloid.

No. 3. Renewed bark of one year's growth and gathered from portions of the stem which yielded No. 1 bark, submitted to Mr. Howard in the spring of 1864.

No. 4. Bark of two years and five months' growth not thickened by the application of moss.

Chinchona Calisaya.

No. 5. Bark of two years and five months' growth.

Chinchona Condaminea.

No. 6. Bark of one year and seven months' growth.

Chinchona micrantha.

No. 7. Bark of two years and five months' growth, thickened by the application of moss.

No. 8. Bark of same growth but not thickened by the application of moss.

(signed) *W. G. McIvor*,
Superintendent, Government Chinchona Plantations.

Ootacamund, 3 May 1865.

— No. 46. —

From the Government of Madras to the Secretary of State for India.

Madras, 26 May 1865.

WE have the honour to forward for your information the accompanying tabular report on the number, condition, &c., of the Chinchona plants on the Neilgherries on the 30th April 1865.

Enclosure to No. 46.

REPORT on the Number, Distribution, and Condition of Chinchona Plants on the Neilgherries, on the 30th April 1865.

Botanical Names.	Commercial Names.	Number of Plants.	Value per Lb. of Dry Bark in the London Market.	REMARKS.
C. succirubra - -	Red Bark - -	150,086	s. d. s. d. 2 6 to 8 9	The weather being favourable, planting operations have been commenced. The number of plants planted out during the month being 2,020, making the total number of plants permanently planted out, 167,371.
C. Calisaya - -	Yellow Bark - -	2,773	2 10 to 7 -	
C. officinalis, var. Condaminea (C. Uritusinga).	Original Lexa Bark -	4,323	2 10 to 7 -	
C. officinalis, var. Bonplandiana (C. Chahuarguera).	Select Crown Bark -	367,718	2 10 to 6 -	The increase by propagation is 27,358, being 7,698 plants above the average of the last six months, making the total number of plants at the end of the month 558,105.
C. crespilla - -	Fine Crown Bark -	2,729	2 10 to 6 -	
C. lancifolia - -	Pitayo Bark -	52	1 8 to 2 10	
C. nitida - -	Genuine Grey Bark -	2,786	1 8 to 2 9	
C. Species without name.	Fine Grey Bark -	8,500	1 8 to 2 10	
C. micrantha - -	Grey Bark - -	14,724	1 8 to 2 9	
C. Peruviana - -	Finest Grey Bark -	3,389	1 8 to 2 10	
C. Pabudiana - -	Unknown - -	425	Unknown.	
TOTAL Number of Plants - - -		558,105		

TABLE II.

MEMORANDUM of the Growth of Eleven Plants of *C. succirubra*, planted on the Second Denison Plantation, at Neddivuttum, on the 30th August 1862.

Number of Plants.	Height in Inches when Planted, on 30 August 1862.	Height in Inches on 31 March 1865.	Height in Inches on 30 April 1865.	Growth in Inches during April 1865.	By whom Planted.
1	23	115	115½	½	His Excellency Sir W. Denison.
2	16½	102¾	103½	¾	
3	19	106	106½	½	
4	15	100	101	1	J. W. Brecks, Esq.
5	27	118	119	1	
6	20	91½	92	¾	
7	20	109	109¾	¾	Dr. Sanderson.
8	18	110½	112	1½	
9	20	114	114½	½	
10	20	114½	115	½	J. D. Sim, Esq.
11	18	99¾	100	½	
12	-	55	56	1	

TABLE II. exhibits the growth of 11 plants of *Chinchona succirubra* planted out by his Excellency the Governor, and other gentlemen, at Neddivuttum, on the 30th August 1862. The average growth of these plants during the month is $\frac{3}{4}$ of an inch, or $\frac{4}{11}$ of an inch above the growth of last month.

One of the two plants cut down on the 20th March 1863 for the bark submitted to Mr. Howard for analysis has made strong shoots of 56 inches in height, giving the growth of one inch during the month.

Plant cut down for bark.

TABLE III.

SHOWING the Height of Twelve Plants of *C. officinalis*, planted on the Dodabetta Plantation, at Ootacamund, on the 30th September 1863.

Number of Plants.	Height in Inches when Planted on 30 September 1863.	Height in Inches on 31 March 1865.	Height in Inches on 30 April 1865.	Growth in Inches during April 1865.	REMARKS.
1	19	74	76	2	The 12 plants of <i>C. officinalis</i> (a shrubby species) on the Dodabetta Plantation, gives an average growth of $2\frac{1}{4}$ inches or $1\frac{1}{2}$ of an inch above the growth of last month.
2	14 $\frac{1}{2}$	68	71	3	
3	28	78 $\frac{1}{2}$	81 $\frac{1}{2}$	3	
4	22	80 $\frac{1}{2}$	82 $\frac{1}{2}$	2	
5	21 $\frac{1}{2}$	76 $\frac{1}{2}$	78	1 $\frac{1}{2}$	
6	28	86	89	3	
7	22 $\frac{1}{2}$	76	79	3	
8	21 $\frac{1}{2}$	74	76	2	
9	21 $\frac{1}{2}$	81	82 $\frac{1}{2}$	1 $\frac{1}{2}$	
10	19 $\frac{1}{2}$	74	76	2	
11	24	78	80	2	
12	24	79	81	2	

TABLE IV.

REGISTER of Chinchona Plants Distributed.

NAMES.	STATION.	Number of Plants.
Mr. F. N. Maltby - - - -	Travancore - - -	16
Dr. Junghuhn - - - -	Java - - -	56
Mr. A. R. Lascelles - - -	Ootacamund - - -	12
Mr. M. Anderson - - - -	Jamaica - - -	2
Dr. Wiehe - - - -	Bombay - - -	10
Dr. T. Anderson - - - -	Calcutta - - -	554
Dr. Jamieson - - - -	Saharanpore - - -	107
Professor Lees - - - -	Calcutta - - -	547
Rajah of Travancore - - -	Travancore - - -	521
Major Morgan - - - -	Ootacamund - - -	1,534
Mr. E. T. Fitzgerald - - -	Calcutta - - -	558
Mr. J. W. B. Money - - - -	- ditto - - -	26,369
Dr. W. Bourne - - - -	- ditto - - -	532
Captain Cox - - - -	Wainad - - -	6
Mr. Hollock - - - -	- ditto - - -	2
Mr. T. Sheffield - - - -	Ootacamund - - -	12
Dr. F. Day - - - -	Cochin - - -	100
Mr. Brown - - - -	Tellicherry - - -	12
Mr. J. Hall - - - -	Ootacamund - - -	144
Mr. J. Knop - - - -	- ditto - - -	18
Captain Lees - - - -	Bengal - - -	281
Mr. W. H. Rayne - - - -	Manantoddy - - -	424
Reverend — Sawyer - - -	Ootacamund - - -	1,018
Mr. Frend - - - -	- ditto - - -	512
Mr. Hollock - - - -	- ditto - - -	1
Mr. J. Perie - - - -	Seegoor - - -	12
Colonel Scott - - - -	Ootacamund - - -	1,226
Mr. Berend - - - -	Cachar - - -	275
Rev. J. Hunter - - - -	Coonoor - - -	12
Mr. J. Mullaly - - - -	- ditto - - -	24
Mr. W. H. Stanes - - - -	- ditto - - -	1,262
Colonel R. Cooper - - - -	Kotagherry - - -	12
Mr. F. Cockburn - - - -	- ditto - - -	12
Colonel Woodfall - - - -	Coonoor - - -	12
Mr. C. Anderson - - - -	- ditto - - -	24
Colonel Angelo - - - -	Ootacamund - - -	12
Rev. E. Laseon - - - -	- ditto - - -	12
Capt. R. N. Taylor - - - -	Coorg - - -	96
Major W. Agnew - - - -	Assam - - -	139
Mr. V. H. Levinge - - - -	Madura - - -	12
Chief Commissioner of Nagpore - - -	Nagpore - - -	28
Mr. Fletcher - - - -	Ootacamund - - -	24
Gool Mahomed - - - -	- ditto - - -	20

The number of plants issued to the public during the month is 25,175, making the total number of plants distributed 78,612.

TABLE IV.—REGISTER of Chinchona Plants Distributed—*continued*.

NAMES.	STATION.	Number of Plants.	REMARKS.
General McCleverty - - -	New Zealand - -	23	
Mr. W. Robinson - - -	Kotagherry - -	30	
Mr. Crake - - -	Wainad - -	12	
Mr. H. R. Dawson - - -	Seegoor - -	12	
Captain Mann - - -	Coorg - -	48	
Mr. E. Roberts - - -	- ditto - -	530	
Mr. H. Russell - - -	Wainad - -	12	
Rev. — Wait - - -	Coonoor - -	2	
Collector of Belgaum - - -	Belgaum - -	28	
Collector of Honore - - -	Honore - -	28	
Dr. Ross - - -	- ditto - -	15	
His Excellency the Governor - -	Bombay - -	158	
Dr. H. Hinde - - -	Wainad - -	12	
Mr. E. B. Thomas - - -	Coonoor - -	12	
Rajah of Poonganoor - - -	Poonganoor - -	12	
Major Grant - - -	Wellington - -	226	
Messrs. Thomson, Shaw, & Co. - -	Poonganoor - -	28	
Mr. J. H. Trinson - - -	- ditto - -	31	
Dr. Muller - - -	Melbourne - -	28	
Mr. Tyrrell - - -	Mysore - -	12	
Dr. Sayers - - -	Vellore - -	12	
Major C. P. Taylor - - -	Ootacamund - -	5,250	
Dr. Wilson - - -	- ditto - -	6	
Mr. Schnarrie - - -	- ditto - -	15,000	
Captain Fuller - - -	Coonoor - -	417	
Mr. Drummond - - -	Ootacamund - -	224	
Captain Jennings - - -	- ditto - -	1,756	
Lieut. H. B. Montmorency - - -	Bangalore - -	6	
Mr. McHutchin - - -	Ootacamund - -	3	
Colonel Molesworth - - -	- ditto - -	6	
Mr. C. Gray - - -	Coonoor - -	12	
Mr. H. B. Leddell - - -	Ootacamund - -	12	
Mr. Minchin - - -	Wynad - -	1,600	
His Excellency the Governor - -	Vizagapatam - -	35	
Mr. R. F. Phillips - - -	Kotagherry - -	1,117	
Colonel Cooke - - -	- ditto - -	24	
Mr. G. J. Glasson - - -	Wynad - -	1,000	
Dr. Macpherson - - -	Mercara - -	400	
Mr. W. H. Kerr - - -	Coorg - -	3,100	
Mr. James - - -	Ootacamund - -	1,000	
Colonel Whish - - -	Bengal - -	82	
Mr. K. Mair - - -	Calcutta - -	1,180	
Mr. W. Shakespear - - -	- ditto - -	61	
Mr. E. E. Meakin - - -	- ditto - -	168	
Mr. C. Ackland - - -	- ditto - -	150	
Mr. K. McIver - - -	- ditto - -	124	
Mr. Havelock - - -	Ootacamund - -	12	
Mr. H. de Facien - - -	Kartairy - -	6,821	
Major Sweet - - -	- ditto - -	102	
Captain Campbell - - -	Bangalore - -	6	
Royal Gardens - - -	Mauritius - -	36	
Honourable W. R. Arbuthnot - -	Wynad - -	93	
Mr. H. Maxwell - - -	Bombay - -	50	
Mrs. C. Smith - - -	Wynad - -	22	
Captain Beckley - - -	Wellington - -	200	
Mr. Walsh - - -	Salem - -	100	
His Excellency the Governor General -	Java - -	175	
Captain Richardson - - -	Kulhatty - -	381	
Rajah of Poonganoor - - -	Poonganoor - -	24	
His Excellency the Governor - -	Madras - -	24	
TOTAL Number of Plants - - -		78,612	

Ootacamund,
13 May 1865.

(signed) *W. G. McIvor*,
Superintendent Government Chinchona Plantations.

— No. 47. —

From the Government of Madras to the Secretary of State for India.

Madras, 17 June 1865.

Proceedings of
Government, 12
June 1865, Nos.
239, 240.

1. WITH reference to paragraph 5 of your Despatch, dated 15th April 1865, Public, No. 12, we have the honour to forward for your information the accompanying report from the Principal Inspector General, Medical Department, on the result of the trial of Chinchona leaves in cases of fever. This report is very meagre and unsatisfactory, but we have issued orders for the repetition of the experiment with leaves of the various kinds of Chinchona, and decoctions or extracts prepared in different ways. The result, when reported, will be duly made known to you.

2. Adverting to paragraph 6 of the Despatch under reply, we have to observe that the superintendent's report on the Chinchona plantations for the year 1863-4 was forwarded to you in March * last, and that portions † thereof relating to the culture of the plant were separately printed, and 300 copies forwarded to Mr. McIvor ‡ for distribution.

Enclosure 1, in No. 47.

MEMORANDUM from the Principal Inspector General, Medical Department, Fort Saint George, 20th May 1865.

Extract from a Letter from the Physician, General Hospital, 30th November 1863.

"Chinchona leaves from Government Garden, Ootacamund, received on 11th April 1863.
"Its decoction prepared with—

Chinchona leaves	-	-	3 x.
Water	-	-	o j.
Acid sulphuric dil.	-	-	3 ij.

and strained, was found to be a good tonic, but quite useless as a febrifuge.

"The specimens of decoction and infusion of Chinchona prepared at Ootacamund, with one-third their respective bulks of spirits, became rather turbid a few days after they were received; and the infusion was tried only once, and that was in a case of intermittent fever. It occasioned febrile disturbance with dryness of tongue, and was therefore discontinued. So large a quantity of spirit, with the very small quantity of alkaloid likely to be present in the infusions and decoctions rendered their employment inadmissible in the generality of periodic fevers. In this hospital 3 i. to 3 iss. is found to be the best proportion of arrack to be given with 10 grains of sulphate of quinine."

(signed) "W. R. Cornish,

"Secretary to Principal Inspector General, Medical Department."

ORDER of the Madras Government, 12th June 1865.

1. THIS report is meagre and unsatisfactory, and the Principal Inspector General will be requested to issue instructions for careful repetition of the experiment with leaves of the various kinds of Chinchona, and with decoctions or extracts prepared in different ways. The superintendent of the Government Chinchona plantations will be instructed to forward the necessary supply of leaves for the purpose.

2. Meanwhile the present report will be communicated to the Secretary of State, with reference to his Despatch, 16th January 1863, No. 2.

Enclosure 2, in No. 47.

From W. G. McIvor, Esq., Superintendent Government Plantation, Ootacamund, to J. D. Sim, Esq., Secretary to Government, Revenue Department of Ootacamund.

Sir,

21 October 1864.

WITH reference to my letter, No. 108, of the 9th July 1864, forwarding the Report on the Government Chinchona Plantations and Botanical Gardens, for the official year 1863-64, I have the honour to request the favour of being furnished, as early as possible, with 300 printed copies in pamphlet size, 6 by 9½ inches, of Paras. 9 to 13 and 24 to 38 inclusive

* To England, 14th March 1865, No. 16, Miscellaneous.

† Paragraphs 9 to 18, and 24 to 38.

‡ From Superintendent Chinchona Plantations, 21st October 1864, No. 165.

inclusive of the above report, in order to enable me to distribute as early as possible information on the modifications which have been found necessary in the cultivation of Chinchona.

2. I make this request as I have numerous applications for a description of these modifications, which I find it impossible to comply with except by means of printed forms.

— No. 48. —

From the Government of Madras to the Secretary of State for India.

Madras, 11 July 1865.

WE have the honour to forward for your information the accompanying tabular report on the number, condition, &c., of the Chinchona plants on the Neilgherries on the 31st May 1865.

Enclosure in No. 48.

REPORT on the Number, Distribution, and Condition of Chinchona Plants on the Neilgherries, on the 31st May 1865.

No. of Species.	Botanical Names.	Commercial Names.	Number of Plants.	Value per Lb. of Dry Bark in the London Market.		REMARKS.
				s.	d.	
1	C. succirubra - -	Red Bark - -	160,711	2	6 to 8	The weather being favourable, planting operations have been commenced, the number of plants planted out during the month being 14,865, making the total number of plants permanently planted out 182,236.
2	C. Calisaya - -	Yellow Bark - -	2,748	2	10 to 7	
3	C. officinalis, var. Condaminea (C. Uritusinga).	Original Loxa Bark -	4,593	2	10 to 7	
4	Ditto var. Bonplan- diana (C. Chahuar- guera).	Select Crown Bark -	380,683	2	10 to 7	
5	C. cespilla - -	Fine Crown Bark -	3,059	2	10 to 6	The increase by propagation is 23,680, being 2,094 plants above the average of the last six months, making the total number of plants at the end of the month 581,578.
6	C. lancifolia - -	Pitayo Bark - -	52	1	8 to 2 10	
7	C. nitida - -	Genuine Grey Bark -	2,786	1	8 to 2 9	
8	C. species without name - -	Fine Grey Bark -	8,500	1	8 to 2 10	
9	C. micrantha - -	Grey Bark - -	14,632	1	8 to 2 9	
10	C. Peruviana - -	Finest Grey Bark -	3,389	1	8 to 2 10	
11	C. Pahudiana - -	Unknown - -	425	Worthless.		
TOTAL Number of Plants - -			5,81,578			

TABLE II.

MEMORANDUM of the Growth of Eleven Plants of *C. succirubra*, planted on the Second Denison Plantation, at Neddivuttum, on the 30th August 1862.

Number of Plants.	Height in Inches when Planted, on 30 August 1862.	Height in Inches on 30 April 1865.	Height in Inches on 31 May 1865.	Growth in Inches during May 1865.	By whom Planted.
1	23	115½	116½	1	His Excellency Sir W. Denison.
2	16½	103½	105	1½	
3	19	106½	107½	1	
4	15	101	101½	½	
5	27	119	120	1	J. W. Brecks, Esq. Dr. Sanderson. J. D. Sim, Esq. Lieutenant McLeod. P. Grant, Esq. Plant cut down for bark.
6	20	92	93	1	
7	20	109½	111	1½	
8	18	112	113	1	
9	20	114½	116	1½	
10	20	115	117	2	
11	18	100	101½	1½	
12	-	56	57½	1½	

TABLE II. exhibits the growth of eleven plants of *Chinchona succirubra* planted out by his Excellency the Governor and other gentlemen at Neddivuttum, on the 30th August 1862. The average growth of these plants during the month is $1\frac{9}{16}$ inches, or about $\frac{1}{3}$ of an inch above the growth of last month.

One of the two plants cut down on the 20th of March 1863 for the bark, submitted to Mr. Howard for analysis, has made strong shoots of $57\frac{1}{2}$ inches in height, giving the growth of $1\frac{1}{2}$ inches during the month.

TABLE III.

SHOWING the Height of Twelve Plants of *C. officinalis*, planted on the Dodabetta Plantation, at Ootacamund, on the 30th September 1863.

Number of Plants.	Height in Inches when Planted on 30 September 1863.	Height in Inches on 30th April 1865.	Height in Inches on 31 May 1865.	Growth in Inches during May 1865.	REMARKS.
1	19	76	81	5	The 12 plants of <i>Chinchona officinalis</i> (a shrubby species) on the Dodabetta Planta- tion, gives an average growth of $3\frac{5}{8}$ inches, or $1\frac{7}{8}$ inches above the growth of last month.
2	$14\frac{1}{2}$	71	76	5	
3	28	$81\frac{1}{2}$	84	$2\frac{1}{2}$	
4	22	$82\frac{1}{2}$	$84\frac{1}{2}$	2	
5	$21\frac{1}{2}$	78	82	4	
6	28	89	95	6	
7	$22\frac{1}{2}$	79	81	2	
8	$21\frac{1}{2}$	76	78	2	
9	$21\frac{1}{2}$	$82\frac{1}{2}$	87	$4\frac{1}{2}$	
10	$19\frac{1}{2}$	76	81	5	
11	24	80	85	5	
12	24	81	84	3	

TABLE IV.

REGISTER of Chinchona Plants Distributed.

NAMES.	STATION.	Number of Plants.	
Mr. F. N. Maltby - - -	Travancore - - -	16	The number of plants issued to the public during the month is 207, making the total number of plants dis- tributed 78,819.
Dr. Junghuhn - - -	Java - - -	56	
Mr. A. R. Lascelles - - -	Ootacamund - - -	12	
„ M. Anderson - - -	Jamaica - - -	2	
Dr. Wiehe - - -	Bombay - - -	10	
Dr. T. Anderson - - -	Calcutta - - -	554	
„ Jamieson - - -	Saharanpore - - -	107	
Professor Lees - - -	Calcutta - - -	547	
Rajah of Travancore - - -	Travancore - - -	521	
Major Morgan - - -	Ootacamund - - -	1,534	
Mr. E. T. Fitzgerald - - -	Calcutta - - -	558	
Mr. J. W. B. Money - - -	- ditto - - -	1,369	
Dr. W. Bourne - - -	- ditto - - -	532	
Captain Cox - - -	Wainad - - -	6	
Mr. Hallock - - -	- ditto - - -	2	
„ T. Sheffield - - -	Ootacamund - - -	12	
Dr. F. Day - - -	Cochin - - -	100	
Mr. Brown - - -	Tellicherry - - -	12	
„ J. Hall - - -	Ootacamund - - -	144	
„ J. Knop - - -	- ditto - - -	18	
Captain Lees - - -	Bengal - - -	281	
Mr. W. H. Rayne - - -	Manantoddy - - -	424	
Rev. — Sawyer - - -	Ootacamund - - -	1,018	
Mr. Frend - - -	- ditto - - -	512	
„ Hollock - - -	- ditto - - -	1	
„ J. Pierie - - -	Seegoor - - -	12	
Colonel Scott - - -	Ootacamund - - -	1,226	
Mr. Berend - - -	Cachar - - -	275	
Rev. J. Hunter - - -	Coonoor - - -	12	
Mr. J. Mullaly - - -	- ditto - - -	24	
„ W. H. Stanes - - -	- ditto - - -	1,262	
Colonel R. Cooper - - -	Kotagherry - - -	12	
Mr. F. Cockburn - - -	- ditto - - -	12	
Colonel Woodfall - - -	Coonoor - - -	12	
Mr. C. Anderson - - -	- ditto - - -	24	
Colonel Angelo - - -	Ootacamund - - -	12	
Rev. E. Laseron - - -	- ditto - - -	12	
Captain R. N. Taylor - - -	Coorg - - -	96	
Major W. Agnew - - -	Assam - - -	139	
Mr. V. H. Levinge - - -	Madura - - -	12	
Chief Commissioner of - - -	Nagpore - - -	28	
Mr. Fletcher - - -	Ootacamund - - -	24	
Gool Mahomed - - -	- ditto - - -	20	

TABLE IV.—REGISTER of Chinchona Plants Distributed—*continued*.

NAMES.	STATIONS.	Number of Plants.	REMARKS.
General McCleverty - - -	New Zealand - - -	23	
Mr. W. Robinson - - -	Kotagherry - - -	30	
" Crake - - -	Waynad - - -	12	
" H. R. Dawson - - -	Seegoor - - -	12	
Captain Mann - - -	Coorg - - -	48	
Mr. E. Roberts - - -	- ditto - - -	530	
" H. Russell - - -	Waynad - - -	12	
Rev. — Wait - - -	Coonoor - - -	2	
Collector of Belgaum - - -	Belgaum - - -	28	
Collector of Honore - - -	Honore - - -	28	
Dr. Ross - - -	- ditto - - -	15	
His Excellency the Governor of	Bombay - - -	158	
Mr. H. Hinde - - -	Waynad - - -	12	
" E. B. Thomas - - -	Coonoor - - -	12	
Rajah of Poonganoor - - -	Poonganoor - - -	12	
Major Grant - - -	Wellington - - -	226	
Messrs. Thomson, Shaw & Co.	Poonganoor - - -	28	
Mr. J. H. Trinson - - -	- ditto - - -	31	
Dr. Muller - - -	Melbourne - - -	28	
Mr. Tyrrell - - -	Mysore - - -	12	
Dr. Sayers - - -	Vellore - - -	12	
Major C. P. Taylor - - -	Ootacamund - - -	5,250	
Dr. Wilson - - -	- ditto - - -	6	
Mr. Schnarrie - - -	- ditto - - -	15,000	
Captain Fuller - - -	Coonoor - - -	417	
Mr. Drummond - - -	Ootacamund - - -	224	
Captain Jennings - - -	- ditto - - -	1,756	
Lieut. H. B. Montmorency - -	Bangalore - - -	6	
Mr. McHutchin - - -	Ootacamund - - -	3	
Colonel Molesworth - - -	- ditto - - -	6	
Mr. C. Gray - - -	Coonoor - - -	12	
" H. B. Leddell - - -	Ootacamund - - -	12	
" Minchin - - -	Wynad - - -	1,600	
His Excellency the Governor - -	Vizagapatam - - -	35	
Mr. R. F. Phillips - - -	Kotagherry - - -	1,117	
Colonel Cooke - - -	- ditto - - -	24	
Mr. G. J. Glasson - - -	Wynad - - -	1,000	
Dr. Macpherson - - -	Mercara - - -	400	
Mr. W. H. Kerr - - -	Coorg - - -	3,100	
" James - - -	Ootacamund - - -	1,000	
Colonel Whish - - -	Bengal - - -	82	
Mr. K. Mair - - -	Calcutta - - -	1,180	
" W. Shakespear - - -	- ditto - - -	61	
" E. E. Meakin - - -	- ditto - - -	168	
" C. Ackland - - -	- ditto - - -	150	
" K. McIver - - -	- ditto - - -	124	
" Havelock - - -	Ootacamund - - -	12	
" H. de Facien - - -	Kartairy - - -	6,821	
Major Sweet - - -	- ditto - - -	102	
Captain Campbell - - -	Bangalore - - -	6	
Royal Gardens - - -	Mauritius - - -	36	
Hon. W. R. Arbuthnot - - -	Wynad - - -	93	
Mr. H. Maxwell - - -	Bombay - - -	50	
Mrs. C. Smith - - -	Wynad - - -	22	
Captain Beckley - - -	Wellington - - -	200	
Mr. Walsh - - -	Salem - - -	100	
His Excellency the Governor General	Java - - -	175	
Captain Richardson - - -	Kulhatty - - -	381	
Rajah of Poonganoor - - -	Poonganoor - - -	24	
His Excellency the Governor - -	Madras - - -	24	
Mr. J. W. B. Money - - -	Ootacamund - - -	25,000	
Captain Mitcheson - - -	- ditto - - -	50	
Mr. R. H. Elliot - - -	Mungerabad - - -	157	
Total Number of Plants - - -		78,819	

Ootacamund,
14 June 1865.

(signed) W. G. McIvor,
Superintendent Government Chinchona Plantations.

— No. 49. —

From the Government of Madras to the Secretary of State for India.

Madras, 25 July 1865.

WE have the honour to forward for your information the accompanying Tabular Report on the Number, Condition, &c., of the Chinchona Plants on the Neilgherries on the 30th June 1865.

Enclosure in No. 49.

REPORT on the Number, Distribution, and Condition of Chinchona Plants on the Neilgherries, on 30 June 1865.

Species.	Botanical Names.	Commercial Names.	Number of Plants.	Value per lb. of Dry Bark in the London Market.	REMARKS.
1	<i>C. succirubra</i> - -	Red Bark - - -	1,79,345	s. d. s. d. 2 6 to 8 9	The number of plants planted out during the month is 11,008, making the total permanently planted out in the plantations 1,93,244.
2	<i>C. Calisaya</i> - -	Yellow Bark - - -	2,726	2 10 to 7 -	
3	<i>C. officinalis</i> , var. <i>Condamenia</i> (<i>C. Uritusinga</i>).	Original Loxa Bark	8,074	2 10 to 7 -	
4	Do. var. <i>Bonplandiana</i> (<i>C. Chahuarguera</i>).	Select Crown Bark -	3,98,875	2 10 to 7 -	One of the flowering plants of <i>C. succirubra</i> (Red bark) has produced a few perfect seeds, and many of this species are now coming into flower, also a few plants of the <i>C. Condaminea</i> and <i>C. Pahudiana</i> ; 380 seeds of the <i>C. Calisaya</i> , <i>Vera</i> , and <i>Frutex</i> , received from Mr. Markham on the 10th, are now beginning to germinate.
5	<i>C. crespilla</i> - -	Fine Crown Bark -	3,059	2 10 to 6 -	
6	<i>C. lancifolia</i> - -	Pitayo Bark - - -	64	1 8 to 2 10	
7	<i>C. nitida</i> - - -	Genuine Grey Bark	2,786	1 8 to 2 9	The increase by propagation is 40,676, being 18,577 plants above the average of the last six months, making the total number of plants at the end of the month 6,21,840.
8	<i>C. Species</i> without name.	Fine Grey Bark -	8,500	1 8 to 2 10	
9	<i>C. micrantha</i> - -	Grey Bark - - -	14,597	1 8 to 2 9	
10	<i>C. Peruviana</i> - -	Finest Grey Bark -	3,389	1 8 to 2 10	Worthless.
11	<i>C. Pahudiana</i> - -	Unknown - - -	425		
TOTAL Number of Plants - - -			6,21,840		

TABLE II.

MEMORANDUM of the Growth of Eleven Plants of *C. succirubra*, planted on the Second Denison Plantation, at Neddivuttum, on 30 August 1862.

Number of Plants.	Height in Inches when Planted on the 30th August 1862.	Height in Inches on the 31st May 1865.	Height in inches on the 30th June 1865.	Growth in Inches during June 1865.	By Whom Planted.
1	23	116½	121	4½	His Excellency Sir W. Denison.
2	16½	105	109	4	
3	19	107½	111	3½	
4	15	101½	103½	2	
5	27	120	123	3	
6	20	93	98	5	J. W. Breeks, Esq.
7	20	111	112½	1½	
8	18	113	117	4	Dr. Sanderson.
9	20	116	117	1	J. D. Sim, Esq.
10	20	117	123	6	Lieutenant McLeod.
11	18	101½	106½	5	P. Grant, Esq.
12	0	57½	64½	7	Plant cut down for bark.

TABLE II. exhibits the growth of eleven plants of *Chinchona succirubra*, planted out by His Excellency the Governor and other gentlemen at Neddivuttum, on the 30th August 1862. The average growth of these plants during the month is 3½ inches being 2½ inches above the growth of last month.

One of the two plants cut down on the 20th of March 1863 for the bark, submitted to Mr. Howard for analysis, has made strong shoots of 64½ inches in height, giving the growth of 7 inches during the month.

TABLE III.

SHOWING the Height of Twelve Plants of *C. officinalis* planted on the Dodabetta Plantation at Ootacamund on the 30th September 1863.

Number of Plants.	Height in Inches when Planted on the 30th September 1863.	Height in Inches on the 31st May 1865.	Height in Inches on the 30th June 1865.	Growth in Inches during June 1865.	REMARKS.
1	19	81	84	3	The 12 plants of <i>Chinchona officinalis</i> (a shrubby species) on the Dodabetta Plantation, gives an average growth of $3\frac{1}{2}$ th inches or $\frac{3}{4}$ ths of an inch under the growth of last month.
2	$14\frac{1}{2}$	76	79	3	
3	28	84	86	2	
4	22	$84\frac{1}{2}$	87	$2\frac{1}{2}$	
5	$21\frac{1}{2}$	82	$85\frac{1}{2}$	$3\frac{1}{2}$	
6	28	95	$97\frac{1}{2}$	$2\frac{1}{2}$	
7	$22\frac{1}{2}$	81	84	3	
8	$21\frac{1}{2}$	78	81	3	
9	$21\frac{1}{2}$	87	$90\frac{1}{2}$	$3\frac{1}{2}$	
10	$19\frac{1}{2}$	81	$84\frac{1}{2}$	$3\frac{1}{2}$	
11	24	85	89	4	
12	24	84	$87\frac{1}{2}$	$3\frac{1}{2}$	

TABLE IV.

REGISTER of Chinchona Plants Distributed.

NAMEs.	STATION.	Number of Plants.	
Mr. F. N. Maltby -	Travancore -	16	The number of plants issued to the public during the month is 414, making the total number of plants distributed 79,233.
Dr. Junghuhn -	Java -	56	
Mr. A. R. Lascelles -	Ootacamund -	12	
„ M. Anderson -	Jamaica -	2	
Dr. Wiche -	Bombay -	10	
„ T. Anderson -	Calcutta -	554	
„ Jamieson -	Saharanpore -	107	
Professor Lees -	Calcutta -	547	
Rajah of Travancore -	Travancore -	521	
Major Morgan -	Ootacamund -	1,534	
Mr. E. T. Fitzgerald -	Calcutta -	558	
„ J. W. B. Money -	ditto -	1,369	
Dr. W. Bourne -	ditto -	532	
Captain Cox -	Wynad -	6	
Mr. Hollock -	ditto -	2	
„ T. Sheffield -	Ootacamund -	12	
Dr. F. Day -	Cochin -	100	
Mr. Brown -	Tellicherry -	12	
„ J. Hall -	Ootacamund -	144	
„ J. Knop -	ditto -	18	
Captain Lees -	Bengal -	281	
Mr. W. H. Rayne -	Manantoddy -	424	
Rev. — Sawyer -	Ootacamund -	1,018	
Mr. Friend -	ditto -	512	
„ Hollock -	ditto -	1	
„ J. Pierie -	Seegoor -	12	
Colonel Scott -	Ootacamund -	1,236	
Mr. Berend -	Cachar -	275	
Rev. J. Hunter -	Coonoor -	12	
Mr. J. Mullaly -	ditto -	24	
„ W. H. Stanes -	ditto -	1,262	
Colonel R. Cocper -	Kotagerry -	12	
Mr. F. Cockburn -	ditto -	12	
Colonel Woodfall -	Coonoor -	12	
Mr. C. Anderson -	ditto -	24	
Colonel Angelo -	Ootacamund -	12	
Rev. E. Laseron -	ditto -	12	
Captain R. N. Taylor -	Coorg -	96	
Major W. Agnew -	Assam -	139	
Mr. V. H. Levinge -	Madura -	12	
Chief Commissioner of -	Nagpore -	28	
Mr. Fletcher -	Ootacamund -	24	
Gool Mahomed -	ditto -	20	

TABLE IV.—Register of Chinchona Plants Distributed—*continued*.

NAMES.	STATION.	Number of Plants.	REMARKS.
General McCleverty - - -	New Zealand - -	23	
Mr. W. Robinson - - -	Kotagherry - -	30	
Mr. Crake - - -	Wynad - - -	12	
Mr. H. R. Dawson - - -	Seegoor - - -	12	
Captain Mann - - -	Coorg - - -	48	
Mr. E. Roberts - - -	- ditto - - -	530	
Mr. H. Russell - - -	Wynad - - -	12	
Rev. — Wait - - -	Coonoor - - -	2	
Collector of Belgaum - - -	Belgaum - - -	28	
Collector of Honore - - -	Honore - - -	28	
Dr. Ross - - -	- ditto - - -	15	
His Excellency the Governor - -	Bombay - - -	158	
Mr. H. Hinde - - -	Wynad - - -	12	
Mr. E. B. Thomas - - -	Coonoor - - -	12	
Rajah of Poonganoor - - -	Poonganoor - -	12	
Major Grant - - -	Wellington - -	226	
Messrs. Thomson, Shaw & Co. -	Poonganoor - -	28	
Mr. J. H. Trinson - - -	- ditto - - -	31	
Dr. Muller - - -	Melbourne - -	28	
Mr. Tyrrell - - -	Mysore - - -	12	
Dr. Sayers - - -	Vellore - - -	12	
Major C. P. Taylor - - -	Ootacamund - -	5,250	
Doctor Wilson - - -	- ditto - - -	6	
Mr. Schnarrie - - -	- ditto - - -	15,000	
Captain Fuller - - -	Coonoor - - -	417	
Mr. Drummond - - -	Ootacamund - -	224	
Captain Jennings - - -	- ditto - - -	1,756	
Lieut. H. B. Montmorency - -	Bangalore - - -	6	
Mr. McHutchin - - -	Ootacamund - -	3	
Colonel Molesworth - - -	- ditto - - -	6	
Mr. C. Gray - - -	Coonoor - - -	12	
Mr. H. B. Leddell - - -	Ootacamund - -	12	
Mr. Minchin - - -	Wynad - - -	1,600	
His Excellency the Governor -	Vizagapatam - -	35	
Mr. R. F. Phillips - - -	Kotagherry - -	1,117	
Colonel Cooke - - -	- ditto - - -	24	
Mr. G. J. Glasson - - -	Wynad - - -	1,000	
Dr. Macpherson - - -	Mercara - - -	400	
Mr. W. H. Kerr - - -	Coorg - - -	3,100	
Mr. James - - -	Ootacamund - -	1,000	
Colonel Whish - - -	Bengal - - -	82	
Mr. K. Mair - - -	Calcutta - - -	1,180	
Mr. W. Shakespear - - -	- ditto - - -	61	
Mr. E. E. Meakin - - -	- ditto - - -	168	
Mr. C. Ackland - - -	- ditto - - -	150	
Mr. K. McIvor - - -	- ditto - - -	124	
Mr. Havelock - - -	Ootacamund - -	12	
Mr. H. de Facien - - -	Kartairy - - -	6,821	
Major Sweet - - -	- ditto - - -	102	
Captain Campbell - - -	Bangalore - - -	6	
Royal Gardens - - -	Mauritius - - -	36	
Honourable W. R. Arbuthnot -	Wynad - - -	93	
Mr. H. Maxwell - - -	Bombay - - -	50	
Mrs. C. Smith - - -	Wynad - - -	22	
Captain Beckley - - -	Wellington - -	200	
Mr. Walsh - - -	Salem - - -	100	
His Excellency the Governor General	Java - - -	175	
Captain Richardson - - -	Kulhatty - - -	381	
Rajah of Poonganoor - - -	Poonganoor - -	24	
His Excellency the Governor -	Madras - - -	24	
Mr. J. W. B. Money - - -	Ootacamund - -	25,000	
Captain Mitcheson - - -	- ditto - - -	50	
Mr. R. H. Elliot - - -	Nunjerabad - -	157	
His Excellency the Governor General	Goa - - -	252	
Colonel Phayre - - -	Rangoon - - -	152	
TOTAL Number of Plants - - -		79,233	

Ootacamund,
14 July 1865.

(signed) *W. G. McIvor*,
Superintendent Government Chinchona Plantations.

— No. 50. —

From Sir *Charles Wood* to the Government of Madras.

India Office, 30 September 1865.

Para. 1. I HAVE considered in Council your Despatches in the Revenue Department, noted in the margin, on the subject of Chinchona cultivation, and have perused, with special interest, Mr. McIvor's valuable report for 1863-64.

No. 11	of 1865,	dated 22d Feb.
" 16	" "	" 14th March.
" 23	" "	" 4th April.
" 27	" "	" 13th "
" 31	" "	" 11th May.
" 34	" "	" 26th "
" 39	" "	" 17th June.
" 48	" "	" 11th July.
" 50	" "	" 25th "

2. I observe, from the statement of expenses connected with Chinchona cultivation, from the commencement of operations to April 30th, 1864, that the actual expenditure has fallen short of the estimate by nearly 4,000 *l*. This result is very satisfactory, and reflects great credit on Mr. McIvor's management.

3. The supply of bark transmitted with your Despatch, dated May 11th, (No. 31), was submitted to Mr. Howard, and I herewith forward 15 copies of the report of his analysis. You will observe that, although this analysis shows that the Neilgherry barks are very rich in febrifuge alkaloids, and that they are, in this respect, incomparably superior to the barks imported from South America, yet that "the crystallisations of quinine are mixed with some sulphate of chinchonidine, which is, commercially, but not medicinally, a disadvantage." At present, quinine is the only product of the bark which has great commercial value, yet it is the opinion of the most eminent chemists, such as Mr. Howard and Dr. De Vrij, who have made the analysis of bark their special study, that, of the other Chinchona alkaloids, chinchonidine and quinidine are very nearly as efficacious as quinine, and that chinchonine, though inferior to the other three, is by no means deficient in febrifuge qualities. I consider it very important, as affecting the commercial interests of the Chinchona experiment, that an authoritative medical decision should be pronounced on the relative value of the Chinchona alkaloids, other than quinine, namely, chinchonidine, quinidine, and chinchonine. The best way of attaining this object would be to appoint a Commission in each Presidency, as has been suggested by Sir Ranald Martin, with instructions to test the efficacy of these alkaloids on a scale sufficiently extensive to ensure decisive results. Such a commission should be composed of medical men who have had long experience in the treatment of fevers, and whose report on a question of this nature would have weight with the medical profession generally. I desire that a Commission for this purpose may be nominated in your Presidency, and in the meanwhile I shall give directions for a supply of the alkaloids in question to be carefully prepared at Mr. Howard's manufactory, and sent out in sufficient quantity to ensure a satisfactory trial of their efficacy. The conclusions arrived at by the Commission should be embodied in a report.

4. The important questions connected with the manufactory of the Chinchona febrifuge at Octacamund, which were brought before me in your Despatch, dated August 12th (No. 80), 1863, have received careful consideration, and I now proceed to place you in possession of my general views on the subject.

5. One great object to be attained in the introduction of Chinchona cultivation into India is to provide an abundant supply of the febrifuge at so cheap a rate as to be within the means of the population at large, the coolies employed on public works and private plantations, the small cultivators, their wives and families. In all future operations this object must be kept steadily in view, although it is also desirable that such a return on the produce of the bark should be secured, as will repay the original outlay and subsequent expenditure on the Chinchona undertaking with good interest.

6. There is every reason to expect that both these objects will be fully attained. Bark sent to the London market will, we know, secure good prices, and thus reimburse the Government for the outlay involved in the collection of plants and seeds in South America, their introduction into India, and subsequent cultivation there. A certain proportion of the bark harvest should, therefore, be disposed of in this way; but it is quite clear that if all the bark is sent to England to be manufactured there, the price of the febrifuge, though somewhat

lowered by reason of the increased supply, will still be such as to put the use of quinine and the other Chinchona alkaloids entirely beyond the reach of the working classes of India.

7. I am, therefore, of opinion, that it will be advisable to establish a manufactory of Chinchona alkaloids in the neighbourhood of the plantations, and thus to secure a plentiful supply of the febrifuge in an efficacious and, at the same time, in an exceedingly cheap form.

8. The details of this measure involve the consideration of numerous complicated and difficult questions, and I am not at present in a position to issue definite instructions in regard to them. But Mr. Markham will visit the Chinchona plantations during the ensuing cold season, and submit a report to your Government upon the whole subject, and I shall then be prepared to consider any detailed plan which you may recommend, with a view to the immediate commencement of a system calculated to ensure the above results in connection with the cultivation of Chinchona bark.

9. With reference to the request contained in your Despatch dated March 14 (No. 16), 1865, that a further supply of *C. Pitayensis* seeds may be forwarded to Madras, I have to inform you, that I have already taken steps to obtain a second instalment of the seeds of this valuable species from the forests of Popayan. 40 copies of Mr. Cross's report of his former proceedings in the forests of New Granada are herewith forwarded.

I have, &c.
(signed) C. Wood.

— No. 51. —

REPORT of an ANALYSIS of the Fourth Remittance of BARK from *India*.

From *J. E. Howard*, Esq., F.L.S., to the Under Secretary of State for India,
1 August 1865.

(See Mr. *McIvor's* Letter, dated 3 May 1865, No. 45.)

Sir,

I HAVE the honour to report that I received, and have during the past month devoted much careful attention to the analysis of eight specimens of bark, referred to in a letter from Madras, dated 3d May 1865.

The whole of the samples were in excellent condition, showing the care and skill bestowed on their cultivation. They contrasted most favourably with specimens from South America, of bark used at the present moment in the extraction of quinine.

The mode of analysis I have followed, in the present instance, is that which is employed to ascertain the commercial value, which rests almost entirely with the crystallisable sulphates, with perhaps some slight loss of the residuary product. The results will compare well with those given in Delondre's "Quinologie."

No. 1 gave of crystallised sulphate, per 100 parts	-	-	-	-	-	-	-	6'00
of alkaloid soluble in extra light ether	-	-	-	-	-	-	-	0'94
of alkaloid insoluble in the above (therefore chinchonine)	-	-	-	-	-	-	-	1'06

Memo.—The sulphate refined into white sulphate of quinine in appearance, but this did not stand the test used for commercial sulphate of quinine.

No. 2 gave of crystallised sulphate	-	-	-	-	-	-	-	5'00
of alkaloid sol. in E. L. ether	-	-	-	-	-	-	-	0'90
of alkaloid insol. in E. L. E. (chinchonine)	-	-	-	-	-	-	-	1'80

Memo.—Refined as above.

No. 3 gave of cryst. sulphate	-	-	-	-	-	-	-	2'72
of alkaloids, sol. in alcohol	-	-	-	-	-	-	-	7'00

Memo.—As I could only submit to examination 165 grains of the bark, the above result must be taken with reserve.

No. 4 gave of cryst. sulphate	-	-	-	-	-	-	-	2'43
of alkaloid sol. in E. L. E.	-	-	-	-	-	-	-	2'03
of alkaloid insol. in E. L. E. (Chinc.)	-	-	-	-	-	-	-	0'60

Memo.—This specimen gave a product not refining quite so well as No. 1.

No. 5.

No. 5 gave of cryst. sulphate	-	-	-	-	-	-	-	-	0.70
of alkaloid sol. in E. L. E.	-	-	-	-	-	-	-	-	0.10
of do. do. but crystallised by evaporation	-	-	-	-	-	-	-	-	0.26
of do. insol. in E. L. E. (Chinc.)	-	-	-	-	-	-	-	-	a trace.

Memo.—This sulphate did not stand the ether test.

No. 6 gave of cryst. sulphate	-	-	-	-	-	-	-	-	0.90
of alkaloid sol. in E. L. E.	-	-	-	-	-	-	-	-	0.60
of do. insol. (Chinc.)	-	-	-	-	-	-	-	-	a trace.

Memo.—The tests showed quinine and chinchonidine.

No. 7 gave of cryst. sulphate	-	-	-	-	-	-	-	-	5.82
of alkaloid sol. in E. L. E. (aricine)	-	-	-	-	-	-	-	-	0.29
of alkaloid insol. in E. L. E. (Chinc.)	-	-	-	-	-	-	-	-	0.39

Memo.—This sulphate is that of commercial quinidine, and contains probably no quinine.

No. 8 gave of cryst. sulphate	-	-	-	-	-	-	-	-	1.26
of alkaloid sol. in E. L. E.	-	-	-	-	-	-	-	-	0.60
of alkaloid insol. in E. L. E. (Chinc.)	-	-	-	-	-	-	-	-	a trace.

Memo.—The product similar to that of No. 7.

I beg to direct special attention to the remark, that the fine white crystallised sulphate of quinine (apparently), made from the bark of *C. succirubra* will not stand the test which is employed to distinguish the pure article in commerce. The cause of this I stated, in my first report, viz., that “the crystallisations obtained are mixed with some sulphate of chinchonidine, which is commercially (but not medicinally) a disadvantage, and one which always attends the products of red bark.” It is, of course, possible to separate the chinchonidine, but then this must very seriously diminish the per centage of six per cent. I obtained from this gross product little more than four per cent. refined in the first instance, though more subsequently, and of this I ascertained about 10 per cent. as chinchonidine. This difficulty must be looked steadily in the face, and I would suggest that it may be obviated, either by a change being wrought in the opinion of the medical world as to the value of chinchonidine as a medicine, or by the plant being encouraged to produce quinine instead of chinchonidine.

The first might be, very probably, the result of a commission of inquiry composed of competent medical practitioners. I may mention that the late Dr. Royle entered zealously, at my suggestion, into the question, and satisfied himself by experiment as to the value of chinchonidine; but I am not aware that he left any written record of the result he attained. My own experiments confirm this view of the question, and I have shown* that this alkaloid, which must not be confounded with chinchonine, must have constituted, in whole or in part, the therapeutic agent in the cure of the Countess of Chinchon, as also that it was the alkaloid successfully employed at Philadelphia. The second alternative may seem visionary at first sight, but when we consider the results at which Mr. McIlvor has arrived, and further, the circumstances under which chinchonidine is produced, this view of the case may be altered.

In No. 7, we have an illustration of what careful cultivation will do, as the plant *C. micrantha*, which (with its congeners the grey barks) produces largely and chiefly chinchonine in its native climate of Huanuco,† now produces a very small portion of chinchonine, and a large quantity of the allied alkaloid quinidine. This is, then, a hopeful change, if time should confirm the observation.

Then chinchonidine seems almost always to accompany quinine in greater or less abundance. It does so in the *Calisaya* of Bolivia, in the lancifolia barks of New Granada, and in various barks of Ecuador and Peru, and markedly in the best of the barks of Loxa. It is highly probable that a very slight circumstance in the growth may determine the production of one or other alkaloid. Dr. Herapath has shown in a communication to the Royal Society, “Researches on the Chinchona Alkaloids,”‡ that the quinine and chinchonidine salts

* “Illustration of Nueva Quinologia sub voc. Chatnuarjuera.”

† A peculiar climate, of which I have recorded Mr. Pritchett’s description under head *C. micrantha*.

‡ Dated 19th June 1857.

salts agree closely among themselves, and differ widely from the quinidine and chinchonine compounds.

I may further remark, that the *Chinchona succirubra* is a tree which varies greatly in its products in its native forests, and that the *Chinchona micrantha*, in Bolivia, approaches to the character of a *Calisaya*, as I have noticed under that head; its bark has a different appearance from that of Huanuco, and again this now sent home varies widely from either of the above. I notice in examination, the peculiar yellow colouring matter common, it seems, to all the forms of the plant, as I have before noticed.

The *Calisaya* bark sent this time by Mr. McIvor is, I fear, an illustration of the possibility of change in the wrong direction, as it contains far too large a percentage of chinchonidine in proportion to the quinine. The appearance of the bark indicates a not very vigorous growth, or at all events it differs from that it assumes in its native locality. It would never be recognised as the bark of *Chinchona Calisaya*.

The bark of No. 6 is recognised by an experienced dealer as "thin rusty crown, worth 1 s. 3 d. to 1 s. 4 d. per lb."§ It is, I presume, the bark of the variety *Bonplandiana*, i. e., the *Colorado del Rey*, as brought home by Cross; it is remarked as more red than is customary with rusty crown.

As the quantity of bark in No. 1 and No. 4 was not exhausted in my experiments, I have returned 1,000 grains of each of these, thinking that it would be a satisfaction to the Government to engage Dr. de Vry, whose chemical skill and experience are so well known, in further researches on the subject.

I have, &c.
(signed) John Eliot Howard.

— No. 52. —

From Mr. Merivale to Mr. Howard.

Sir,

India Office, London, 28 September 1865.

I AM directed by the Secretary of State for India to acknowledge the receipt of your report of an analysis of the fourth remittance of chinchona bark from the Neilgherry Hills, and to express to you his thanks for the careful attention you have devoted to this important investigation. The results of the analysis are, on the whole, very satisfactory.

2. Sir Charles Wood is impressed with the necessity of obtaining decisive professional opinions on the relative efficacy of the different *Chinchona* alkaloids; and he is of opinion that it will be advisable to appoint medical commissions in India to report upon the subject. It will therefore be necessary to send out a sufficient quantity of the alkaloids in question to ensure a satisfactory trial of their efficacy, and I am to inquire whether you are willing, and if so, upon what terms, to enter into a contract to supply salts of chinchonidine, quinidine, and chinchonine, specially prepared at your own manufactory, in such quantity as may be required.

I am, &c.
(signed) Herman Merivale.
J. E. Howard, Esq.,
2, Lordship-lane, Tottenham, N.

— No. 53. —

From Mr. Merivale to Sir Ranald Martin.

Sir,

India Office, 30 September 1865.

I AM desired by the Secretary of State for India in Council to enclose for your information a copy of a report by Mr. Howard, the quinine manufacturer, on an analysis of specimens of *Chinchona* bark recently received from the Neilgherry Hills, and to call your special attention to the first two paragraphs.

2. Sir

§ From Messrs. Jenkin and Phillips to Mr. J. E. Howard.—"51, Lime Street, 21st July 1865.—The sample of bark you left with us appears to be thin rusty crown, worth 1 s. 3 d.—1 s. 4 d. per lb. We thank you for the sight of it."

2. Sir Charles Wood considers it very important, as affecting the commercial interests of the Chinchona experiment, that an authoritative medical decision should be pronounced on the relative value of the Chinchona alkaloids, other than quinine, namely, chinchonidine, quinidine, and chinchonine. It is his intention to instruct the Governments in India to nominate commissions, composed of medical men, to test and report upon the efficacy of these alkaloids. A supply of them will be carefully prepared by Mr. Howard, and I am to request that you will state what quantity, in your opinion, should be sent to each Presidency, in order to ensure a satisfactory trial of their efficacy. I may add, that quinine has been indented for, during the last three years, in the following quantities:—

	1862.	1863.	1864.
		<i>Lbs.</i>	<i>Lbs.</i>
Bengal - - - - -	Nil.	365	2,016
Madras - - - - -	Nil.	Nil.	650
Bombay - - - - -	Nil.	Nil.	Nil.

I am, &c.

Sir Ranald Martin, M.D.,
37, Upper Brook-street.

(signed) *Herman Merivale.*

— No. 54. —

From Sir *Ranald Martin* to Mr. *Merivale*.

Sir,

37, Upper Brook-street, 3 October 1865.

I HAVE the honour to report, for the information of the Secretary of State for India in Council, in reference to your letter of the 30th ultimo, with its enclosure, and chiefly to the first two paragraphs in page 4 of Mr. Howard's report, as follows:—

2. I consider it of the greatest importance that reliable experiments on the relative values of the Chinchona alkaloids be instituted without delay; for we are as yet without data for forming any satisfactory conclusions on the subject.

3. These alkaloids are so similar in their chemical constitution, and in many of their properties, that I cannot think we are doing right in confining our attention almost exclusively to one of them (quinine), leaving the others almost wholly without notice.

4. The composition of chinchonidine is the same as that of chinchonine; while, as the experiments of Mr. Howard show, the difficulty of separating it from quinine (while chinchonine is easily separable) seems to constitute it a link between the alkaloids.

5. Again, the so-called amorphous quinine (quinoidine) is identical in composition with quinine; it stands in the same relation to quinine that treacle does to sugar, that is, it is quinine slightly altered, probably in the process of manufacture.

6. The following table indicates the relative commercial value of the best known Chinchona alkaloids:—

	<i>s.</i>	<i>d.</i>
Sulphate of Quinine, per lb. - - - - -	80	-
„ Quinidine „ - - - - -	56	-
„ Chinchonine „ - - - - -	11	-
Quinoidine „ - - - - -	2	9

7. I cannot think that these articles differ medicinally to anything like the same extent as their values; and if it can be satisfactorily established that the cheaper alkaloids are equal, or nearly equal, in power to the higher price, it would be a material and important gain to hospitals, and to the treatment of the poor all over the world.

8. I am therefore disposed to think that Mr. Howard is justified in supposing that chinchonidine is not, from a medicinal point of view, an objectionable impurity; still I cannot recommend that the presence of chinchonidine in commercial sulphate of quinine should be sanctioned.

9. It is essential that chemical products furnished for medical purposes shall be pure and simple in their nature, and not variable mixtures of two or more similar substances, a condition which would open a door at once to wilful adul-

teration;

teration; for it is only when dealing with simple substances that ready tests can be given for ascertaining their purity.

10. If chinchonidine is really superior, or even equal, to quinine, let it be furnished in commerce pure, and under its proper name. I think that quinoidine deserves a special and extended trial, on account of its very low price of 2s. 9d. per pound.

11. With regard to the suggestion offered by Mr. Howard, that the plants should be encouraged, by peculiar treatment, to produce quinine rather than chinchonidine, I think there is a possibility of success in this direction. If we consider that under variable conditions of heat and light certain fruits will contain, sometimes quantities of acids, sometimes large quantities of sugar; that when common hemp grown in India becomes a powerful narcotic, while the seeds taken from that very hemp, grown in England, produces a plant destitute of narcotic property; that when the common potatoe, caused to vegetate in the absence of sunlight, develops a powerful poison (solanum), there is some hope that the products of Chinchona may be modified to useful purposes by judicious treatment.

12. Perhaps the experiences of vine growers might afford valuable hints as to the best methods of training plants, so as to secure the greatest yield of medicinally useful alkaloids.

13. I should say that the most practical proceeding would be to collect the whole alkaloid from one species, or from one species treated in a particular way, *quoad* manure, soil, light, elevation, &c., and compare the total yield of alkaloid per cent., and the therapeutical value of the whole product, with that obtained under different circumstances.

14. A commission of medical officers at each Presidency would be necessary, to examine and report on the comparative actions and uses of the several alkaloids thus prepared, in the treatment of the malarious fevers of India, remittent and intermittent, testing their efficacy especially in the fevers of the most notoriously unhealthy districts and stations.

15. Chinchonine has been found highly useful in the treatment of the milder marsh fevers of France and Italy; but it failed to cure the pernicious or malignant fevers of those countries. The same results would probably be obtained from the same trials in the East Indies.

I have, &c.

To the Under Secretary of State for India,
India Office, London.

(signed) *J. R. Martin.*

P. S.—For purposes of experiment and test, I think that the following quantities of the several alkaloids may prove sufficient for use, under direction of the proposed medical commissions at each Presidency:—

	<i>Lbs.</i>
For Bengal - - - - -	12
„ Madras - - - - -	8
„ Bombay - - - - -	6
	<i>J. R. M.</i>

— No. 55. —

From Mr. *Howard* to Mr. *Merivale*.

The Court, Wellington, Somerset,
3 October 1865.

Sir,

I HAVE the honour of acknowledging receipt through your hands of the thanks of the Secretary of State for India for my investigation of the Chinchona bark from the Neilgherry Hills; and, in reference to the inquiry in your letter, beg to state that I shall be happy to supply a sufficient quantity of the different Chinchona alkaloids specially prepared for the purpose of the medical commission.

It will be desirable that our firm, Howard and Sons, Stratford, E., should be informed in good time of the quantity of each alkaloid required, and also of the state in which each is to be sent, whether pure, or as sulphates, or muriates, or other state of combination. I may mention that the muriate of chinchonine is the form most convenient for dispensing, and the sulphates of the other alkaloids.

I am, &c.

Herman Merivale, Esq.

(signed) *John Eliot Howard.*

— No. 56 —

From Mr. *Deedes* to Sir *Ranald Martin*.

6 October 1865.

WITH reference to the request contained in the annexed letter from Mr. Howard, the Secretary in the Public Department will thank Sir Ranald Martin if he will acquaint him in what state, in his opinion, the Chinchona alkaloids should be transmitted to India, with any observations he may wish to make on Mr. Howard's letter.

Henry Deedes.

— No. 57. —

From Sir *Ranald Martin* to Mr. *Deedes*.

Sir, 37, Upper Brook-street, 8 October 1865.

ON the subject of Mr. Howard's letter, referred to me from the Public Department on the 6th instant, I beg leave to observe:

1. That the muriate of Chinchona may be an excellent preparation, and that this form of alkaloid may be the best for dispensing.

2. But we are here about to institute experiments of a comparative nature, and I think it very desirable that all the Chinchona alkaloids should be in the form of sulphates.

3. It might be objected hereafter that an experiment lost half its value because the quinine was a sulphate, while the chinchonine was a muriate.

On these grounds I would recommend that all the preparations be sulphates.

I have, &c.

(signed) *J. R. Martin.*

To Henry C. Deedes, Esq.,
Secretary, Public Department, India Office.

— No. 58. —

From Mr. *Merivale* to Messrs. *Howard*.

Gentlemen,

India Office, 13 October 1865.

WITH reference to Mr. J. E. Howard's letter of the 3rd instant, I am directed by the Secretary of State for India in Council, to inform you that it is thought most advisable that the alkaloids, for the investigation which it is proposed should be made into the Chinchona bark from the Neilgherry Hills, should be in the form of sulphates, and that the quantities of each should be in the proportion of—

									<i>Lbs.</i>
For Bengal	-	-	-	-	-	-	-	-	12
„ Madras	-	-	-	-	-	-	-	-	8
„ Bombay	-	-	-	-	-	-	-	-	6

I am to request that you will have these chemicals properly packed and forwarded to the Director General of Stores, India Office, Cannon Row, Westminster, who will receive directions regarding their transmission to their several destinations.

I am, &c.,

(signed) *Herman Merivale.*

Messrs. Howard and Sons,
Stratford, E.

— No. 59. —

From Messrs. *Howard* to Mr. *Merivale*.

Sir,

Stratford, near London, 16 October 1865.

WE are in receipt of your favour of 13th instant, with instructions from the Secretary of State for India in Council, containing order for Chinchona alkaloids for Bengal, Madras, and Bombay, which we have put in hand, and which shall be executed with as little delay as possible. As, however, the articles have to be prepared with special care, some little time must necessarily elapse before they can be ready for delivery.

We have, &c.

(signed) *Howard and Sons.*

Herman Merivale, Esq.,
India Office, London.

— No. 60. —

From the Government of Madras to the Secretary of State for India.

Madras, 24 August 1865.

WE have the honour to forward for your information the accompanying Tabular Report on the number, condition, &c., of the Chinchona plants on the Neilgherries on the 31st July 1865.

Enclosure in No. 60.

REPORT on the Number, Distribution, and Condition of Chinchona Plants on the Neilgherries, on 31 July 1865.

No. of Species.	Botanical Names.	Commercial Names.	Number of Plants.	Value per Lb. of Dry Bark in the London Market.	REMARKS.
1.	<i>C. succirubra</i> - -	Red Bark - -	205,805	<i>s. d.</i> 2 6 to <i>s. d.</i> 8 9	The number of plants planted out during the month is 11,434, making the total permanently planted out in the plantations 2,05,678. The month has been very stormy from the 4th to the 13th, and the plants on the second Denison plantation have suffered considerably from the winds, especially the 11 plants planted out by his Excellency the Governor on the 30th August 1862. The assistant superintendent, in his anxiety to protect these plants from the storm, placed mats around them, which, escaping from the ties and flapping against the plants, cut and barked the branches, producing far greater injury than the plants had been unprotected they have, nevertheless, made a
2.	<i>C. Calisaya</i> , var. <i>frutetex</i> , var. <i>vera</i> .	Yellow Bark - -	2,958	2 10 to 7 -	
3.	<i>C. officinalis</i> , var. <i>Condamenia</i> (<i>C. Uritusinga</i>).	Original Loxa Bark	7,974	2 10 to 7 -	
4.	<i>C. officinalis</i> , var. <i>Bonplandiana</i> (<i>C. Chahuarguera</i>).	Select Crown Bark -	421,640	2 10 to 6 -	
5.	<i>C. crespilla</i> - -	Fine Crown Bark - -	3,139	2 10 to 6 -	
6.	<i>C. lancifolia</i> - -	Pitayo Bark - -	64	1 8 to 2 10	
7.	<i>C. nitida</i> - -	Genuine Grey Bark	2,786	1 8 to 2 9	
8.	<i>C. Species</i> without name.	Fine Grey Bark - -	8,500	1 8 to 2 10	
9.	<i>C. micrantha</i> - -	Grey Bark - -	4,917	1 8 to 2 9	
10.	<i>C. Peruviana</i> - -	Finest Grey Bark -	3,389	1 8 to 2 10	
11.	<i>C. Pahudiana</i> - -	Unknown - -	425	Unknown.	
TOTAL Number of Plants - - -			671,597		

average growth of $1\frac{2}{11}$ inches during the month, and they are now beginning to recover from the effects of the storm.

None of the plants on the first Denison or Markham plantations suffered materially from the effects of this storm, thus establishing the great importance of aspect for Chinchona cultivation. Some thousands of plants of the *C. succirubra* are now in full bloom, and present a very attractive appearance; also several plants of the *C. Calisaya*, *C. micrantha*, *C. Peruviana*, *C. nitida*, *C. officinalis* and its varieties we may therefore shortly expect an abundant supply of seeds of all the most valuable species.

The increase by propagation is 51,422, being 26,545 plants above the average of the last 3 months, making the total at the end of the month 6,71,597.

TABLE II.

MEMORANDUM of the Growth of Eleven Plants of *C. succirubra*, planted on the Second Denison Plantations, at Neddivuttum, on 30 August 1862.

Number of Plants.	Height in Inches when Planted on 30 August 1862.	Height in Inches on 30 June 1865.	Height in Inches on 31 July 1865.	Growth in Inches during July 1865.	By whom Planted.
1	23	121	122 $\frac{1}{4}$	1 $\frac{1}{4}$	His Excellency Sir William Denison.
2	16 $\frac{1}{2}$	109	109 $\frac{3}{4}$	$\frac{3}{4}$	
3	19	111	112	1	
4	15	103 $\frac{1}{2}$	104 $\frac{1}{4}$	$\frac{3}{4}$	
5	27	123	124 $\frac{1}{4}$	1 $\frac{1}{4}$	
6	20	98	99	1	J. W. Brecks, Esq. Dr. Sanderson. J. D. Sim, Esq. Lieutenant McLeod. P. Grant, Esq. Plant cut down for bark.
7	20	112 $\frac{1}{2}$	113	$\frac{1}{2}$	
8	18	117	119	2	
9	20	117	119 $\frac{3}{4}$	2 $\frac{1}{4}$	
10	20	123	123 $\frac{3}{4}$	$\frac{3}{4}$	
11	18	106 $\frac{1}{2}$	108	1 $\frac{1}{2}$	
12	-	64 $\frac{1}{2}$	68 $\frac{1}{4}$	3 $\frac{3}{4}$	

TABLE II. exhibits the growth of 11 plants of *C. succirubra* planted out by his Excellency the Governor and other gentlemen, at Neddivuttum, on the 30th August 1862. The average growth of these plants during the month was $1\frac{2}{11}$ inches, being $2\frac{4}{11}$ inches under the growth of last month.

One of the two plants cut down on the 20th March 1863, for the bark submitted to Mr. Howard for analysis, has made strong shoots of 68 $\frac{1}{4}$ inches in height, giving the growth of 3 $\frac{3}{4}$ inches during the month.

TABLE III.—SHOWING the Height of Twelve Plants of *C. officinalis*, planted on the Dodabetta Plantation, at Ootacamund, on 30 September 1863.

Number of Plants.	Height in Inches when Planted on 30 September 1863.	Height in Inches on 30 June 1865.	Height in Inches on 31 July 1865.	Growth in Inches during July 1865.	REMARKS.
1	19	84	88	4	The 12 plants of <i>C. officinalis</i> (a shrubby species) on the Dodabetta plantation gives an average growth of $3\frac{1}{2}$ inches, or $\frac{1}{6}$ of an inch above the growth of last month.
2	14 $\frac{1}{2}$	79	83 $\frac{1}{2}$	4 $\frac{1}{2}$	
3	28	86	89	3	
4	22	87	88 $\frac{1}{2}$	1 $\frac{1}{2}$	
5	21 $\frac{1}{2}$	85 $\frac{1}{2}$	89	3 $\frac{1}{2}$	
6	28	97 $\frac{1}{2}$	102	4 $\frac{1}{2}$	
7	22 $\frac{1}{2}$	84	87	3	
8	21 $\frac{1}{2}$	81	84 $\frac{1}{2}$	3 $\frac{1}{2}$	
9	21 $\frac{1}{2}$	90 $\frac{1}{2}$	94	3 $\frac{1}{2}$	
10	19 $\frac{1}{2}$	84 $\frac{1}{2}$	87	2 $\frac{1}{2}$	
11	24	89	93	4	
12	24	87 $\frac{1}{2}$	91	3 $\frac{1}{2}$	

TABLE IV.—REGISTER of Chinchona Plants Distributed.

NAMES.	STATION.	Number of Plants.
Mr. F. N. Maltby	Travancore	16
Dr. Junghuhn	Java	56
Mr. A. R. Lascelles	Ootacamund	12
Mr. M. Anderson	Jamaica	2
Dr. Wiche	Bombay	10
Dr. T. Anderson	Calcutta	554
Dr. Jamieson	Saharanpore	107
Professor Lees	Calcutta	547
Rajah of Travancore	Travancore	521
Major Morgan	Ootacamund	1,534
Mr. E. T. Fitzgerald	Calcutta	558
Mr. J. W. B. Money	- ditto -	1,369
Dr. W. Bourne	- ditto -	532
Captain Cox	Wynad	6
Mr. Hollock	- ditto -	2
Mr. T. Sheffield	Ootacamund	12
Dr. F. Day	Cochin	100
Mr. Brown	Tellicherry	12
Mr. J. Hall	Ootacamund	144
Mr. J. Knop	- ditto -	18
Captain Lees	Bengal	281
Mr. W. H. Rayne	Manantoddy	424
Rev. — Sawyer	Ootacamund	1,018
Mr. Frend	- ditto -	512
Mr. Hollock	- ditto -	1
Mr. J. Pierie	Seegoor	12
Colonel Scott	Ootacamund	1,236
Mr. Berend	Cachar	275
Rev. J. Hunter	Coonoor	12
Mr. J. Mullaly	- ditto -	24
Mr. W. H. Stanes	- ditto -	1,262
Colonel R. Cooper	Kotagherry	12
Mr. F. Cockburn	- ditto -	12
Colonel Woodfall	Coonoor	12
Mr. C. Anderson	- ditto -	24
Colonel Angelo	Ootacamund	12
Rev. E. Laseron	- ditto -	12
Captain R. N. Taylor	Coorg	96
Major W. Agnew	Assam	139
Mr. V. H. Levinge	Madura	12
Chief Commissioner of	Nagpore	28
Mr. Fletcher	Ootacamund	24
Gool Mahomed	- ditto -	20
General McCleverty	New Zealand	23
Mr. W. Robinson	Kotagherry	30

The number of plants issued to the public during the month, is 1,665, making the total number of plants distributed, 80,898.

It is worthy of remark, that during the heaviest storms none of the older plants have been blown down, as they obtain great support from the dense mass of fibrous roots they produce.

TABLE IV.—Register of Chinchona Plants Distributed—*continued.*

NAMES.	STATION.	Number of Plants.	REMARKS.
Mr. Crake - - - - -	Wynad - - - - -	12	
Mr. H. R. Dawson - - - - -	Seegor - - - - -	12	
Captain Mann - - - - -	Coorg - - - - -	48	
Mr. E. Roberts - - - - -	- ditto - - - - -	530	
Mr. H. Russell - - - - -	Wynad - - - - -	12	
Rev. - Wait - - - - -	Coonoor - - - - -	2	
Collector of Belgaum - - - - -	Belgaum - - - - -	28	
Collector of Honore - - - - -	Honore - - - - -	28	
Dr. Ross - - - - -	- ditto - - - - -	15	
His Excellency the Governor - - - - -	Bombay - - - - -	158	
Mr. H. Hinde - - - - -	Wynad - - - - -	12	
Mr. E. B. Thomas - - - - -	Coonoor - - - - -	12	
Rajah of Poonganoor - - - - -	Poonganoor - - - - -	12	
Major Grant - - - - -	Wellington - - - - -	226	
Messrs. Thomson, Shaw & Co. - - - - -	Poonganoor - - - - -	28	
Mr. J. H. Trinson - - - - -	- ditto - - - - -	31	
Dr. Muller - - - - -	Melbourne - - - - -	28	
Mr. Tyrrell - - - - -	Mysore - - - - -	12	
Dr. Sayers - - - - -	Vellore - - - - -	12	
Major C. P. Taylor - - - - -	Ootacamund - - - - -	5,250	
Doctor Wilson - - - - -	- ditto - - - - -	6	
Mr. Schnarrie - - - - -	- ditto - - - - -	15,000	
Captain Fuller - - - - -	Coonoor - - - - -	417	
Dr. Drummond - - - - -	Ootacamund - - - - -	224	
Captain Jennings - - - - -	- ditto - - - - -	1,756	
Lieut. H. B. Montmorency - - - - -	Bangalore - - - - -	6	
Mr. McHutchin - - - - -	Ootacamund - - - - -	3	
Colonel Molesworth - - - - -	- ditto - - - - -	6	
Mr. C. Gray - - - - -	Coonoor - - - - -	12	
Mr. H. B. Leddell - - - - -	Ootacamund - - - - -	12	
M. Minchin - - - - -	Wynad - - - - -	1,600	
His Excellency the Governor - - - - -	Vizagapatam - - - - -	35	
Mr. R. F. Phillips - - - - -	Kotagherry - - - - -	1,117	
Colonel Cooke - - - - -	- ditto - - - - -	24	
Mr. G. J. Glasson - - - - -	Wynad - - - - -	1,000	
Dr. Macpherson - - - - -	Mercara - - - - -	400	
Mr. W. H. Kerr - - - - -	Coorg - - - - -	3,100	
Mr. James - - - - -	Ootacamund - - - - -	1,000	
Colonel Whish - - - - -	Bengal - - - - -	82	
Mr. K. Mair - - - - -	Calcutta - - - - -	1,180	
Mr. W. Shakespear - - - - -	- ditto - - - - -	61	
Mr. E. E. Meakin - - - - -	- ditto - - - - -	168	
Mr. C. Ackland - - - - -	- ditto - - - - -	150	
Mr. K. McIver - - - - -	- ditto - - - - -	124	
Mr. Havelock - - - - -	Ootacamund - - - - -	12	
Mr. H. de Facien - - - - -	Kartairy - - - - -	6,821	
Major Sweet - - - - -	- ditto - - - - -	102	
Captain Campbell - - - - -	Bangalore - - - - -	6	
Royal Gardens - - - - -	Mauritius - - - - -	36	
Hon. W. R. Arbuthnot - - - - -	Wynad - - - - -	93	
Mr. H. Maxwell - - - - -	Bombay - - - - -	50	
Mrs. C. Smith - - - - -	Wynad - - - - -	22	
Captain Beckley - - - - -	Wellington - - - - -	200	
Mr. Walsh - - - - -	Salem - - - - -	100	
His Excellency the Governor General - - - - -	Java - - - - -	175	
Captain Richardson - - - - -	Kulhatty - - - - -	381	
Rajah of Poonganoor - - - - -	Poonganoor - - - - -	24	
His Excellency the Governor - - - - -	Madras - - - - -	24	
Mr. J. W. B. Money - - - - -	Ootacamund - - - - -	25,000	
Captain Mitcheson - - - - -	- ditto - - - - -	50	
Mr. R. H. Elliot - - - - -	Nunjerabad - - - - -	157	
His Excellency the Governor General - - - - -	Goa - - - - -	252	
Colonel Phayre - - - - -	Rangoon - - - - -	152	
Mr. Ryall - - - - -	Kotagherry - - - - -	24	
Mr. J. Gordon - - - - -	Coonoor - - - - -	1,529	
Mr. J. Rohde - - - - -	Neddivuttum - - - - -	100	
Mr. J. Higginbotham - - - - -	Goodaloor - - - - -	12	
Total Number of Plants - - - - -		80,898	

Ootacamund,
12 August 1865.

(signed) *W. G. McIvor,*
Superintendent Government Chinchona Plantations.

— No. 61. —

From the Government of Madras to the Secretary of State for India.

Madras, 23 September 1865.

WE have the honour to forward for your information the accompanying Tabular Report on the number, condition, &c. of the Chinchona plants on the Neilgherries on the 31st August 1865.

Enclosure in No. 61.

REPORT on the Number, Distribution, and Condition of Chinchona Plants on the Neilgherries, on 31 August 1865.

No. of Species.	Botanical Names.	Commercial Names.	Number of Plants.	Value per Lb. of Dry Bark in the London Market.	REMARKS.
				<i>s. d.</i> <i>s. d.</i>	
1	<i>C. succirubra</i> - -	Red Bark - -	2,14,948	2 6 to 8 9	The number of plants planted out during the month is 39,193; making the total permanently planted out in the plantations 2,44,871. The increase by propagation is 25,424, being 5,125 plants under the average of the last six months, making the total at the end of the month 6,96,853
2	<i>C. Calisaya</i> , var. frut. -	Yellow Bark - -	3,153	2 10 to 7 -	
3	<i>C. officinalis</i> , var. Condemenia (<i>C. Uritusinga</i>).	Original Loxa Bark	8,559	2 10 to 7 -	
4	<i>C. officinalis</i> , var. Bonplandiana (<i>C. Chahuarguera</i>).	Select Crown Bark -	4,36,962	2 10 to 7 -	
5	<i>C. crespilla</i> - -	Fine Crown Bark -	3,139	2 10 to 6 -	
6	<i>C. lancifolia</i> - -	Pitayo Bark - -	93	1 8 to 2 10	
7	<i>C. nitida</i> - -	Genuine Grey Bark	2,786	1 8 to 2 9	
8	<i>C. Species</i> without name.	Fine Grey Bark -	8,500	1 8 to 2 10	
9	<i>C. micrantha</i> - -	Grey Bark - -	14,899	1 8 to 2 9	
10	<i>C. Peruviana</i> - -	Finest Grey Bark -	3,389	1 8 to 2 10	
11	<i>C. Pahudiana</i> - -	Unknown - -	425	Unknown.	
TOTAL Number of Plants - - -			6,96,853		

TABLE II.

MEMORANDUM of the Growth of Eleven Plants of *C. succirubra*, planted on the 2d Denison Plantation, at Neddivuttum, on 30 August 1862.

Number of Plants.	Height in Inches when Planted on 30 August 1862.	Height in Inches on 31 July 1865.	Height in Inches on 31 August 1865.	Growth in Inches during August 1865.	By whom Planted.
1	23	122½	124	1½	His Excellency Sir W. Denison.
2	16½	109¾	110½	¾	
3	19	112	113	1	
4	15	104½	105	¾	
5	27	124½	125½	1	
6	20	99	100	1	J. W. Breeks, Esq. Dr. Sanderson. J. D. Sim, Esq. Lientenant McLeod. P. Grant, Esq. Plant cut down for bark
7	20	113	113½	½	
8	18	119	120	1	
9	20	119½	121	1½	
10	20	123¾	124½	¾	
11	18	108	109	1	
12	-	68½	70½	2½	

TABLE II. exhibits the growth of eleven plants of *C. succirubra* planted out by his Excellency the Governor and other gentlemen, at Neddivuttum, on the 30th August 1862. The average growth of these plants during the month is 1 inch, being $\frac{2}{11}$ of an inch under the growth of last month.

One of the two plants cut down on the 20th of March 1863, for the bark submitted to Mr. Howard for analysis, has made strong shoots of 70½ inches in height, giving the growth of 2½ inches during the month.

TABLE III.

SHOWING the Height of Twelve Plants of *C. officinalis*, planted on the Dodabetta Plantation, at Ootacamund, on 30 September 1863.

Number of Plants.	Height in Inches when Planted, on 30 September 1863.	Height in Inches on 31 July 1865.	Height in Inches on 31 August 1865.	Growth in Inches during August 1865.	REMARKS.
1	19	88	92½	4½	The 12 plants of <i>C. officinalis</i> (a shrubby species) on the Dodabetta plantation, gives an average growth of 3½ inches, or ½ of an inch above the growth of last month.
2	14½	83½	86	2½	
3	28	89	94½	5½	
4	22	88½	90½	2	
5	21½	89	93½	4½	
6	28	102	105½	3½	
7	22½	87	89½	2½	
8	21½	84½	87½	3	
9	21½	94	97½	3½	
10	19½	87	90½	3½	
11	24	93	97	4	
12	24	91	96	5	

TABLE IV.

REGISTER of Chinchona Plants Distributed.

NAMES.	STATION.	Number of Plants.
Mr. F. N. Maltby - - - -	Travancore - - -	16
Dr. Junghuhn - - - -	Java - - -	56
Mr. A. R. Lascelles - - -	Ootacamund - - -	12
Mr. M. Anderson - - - -	Jamaica - - -	2
Dr. Wiche - - - -	Bombay - - -	10
Dr. T. Anderson - - - -	Calcutta - - -	554
Dr. Jamieson - - - -	Saharanpore - - -	107
Professor Lees - - - -	Calcutta - - -	547
Rajah of Travancore - - -	Travancore - - -	521
Major Morgan - - - -	Ootacamund - - -	1,534
Mr. E. T. Fitzgerald - - -	Calcutta - - -	558
Mr. J. W. B. Money - - -	- ditto - - -	1,369
Mr. W. Bourne - - - -	- ditto - - -	532
Captain Cox - - - -	Wynad - - -	6
Mr. Hollock - - - -	- ditto - - -	2
Mr. T. Sheffield - - - -	Ootacamund - - -	12
Dr. F. Day - - - -	Cochin - - -	100
Mr. Brown - - - -	Tellicherry - - -	12
Mr. J. Hall - - - -	Ootacamund - - -	144
Mr. T. Knop. - - - -	- ditto - - -	18
Captain Lees - - - -	Bengal - - -	281
Mr. W. H. Rayne - - - -	Manantoddy - - -	424
Rev. — Sawyer - - - -	Ootacamund - - -	1,018
Mr. Frend - - - -	- ditto - - -	512
Mr. Hollock - - - -	- ditto - - -	1
Mr. J. Pierie - - - -	Seegoor - - -	12
Colonel Scott - - - -	Ootacamund - - -	1,236
Mr. Berend - - - -	Cachar - - -	275
Rev. J. Hunter - - - -	Coonoor - - -	12
Mr. J. Mullaly - - - -	- ditto - - -	24
Mr. W. H. Stanes - - - -	- ditto - - -	1,262
Colonel R. Cooper - - - -	Kotagherry - - -	12
Mr. F. Cockburn - - - -	- ditto - - -	12
Colonel Woodfall - - - -	Coonoor - - -	12
Mr. C. Anderson - - - -	- ditto - - -	24
Colonel Angelo - - - -	Ootacamund - - -	12
Rev. E. Laseron - - - -	- ditto - - -	12
Captain R. N. Taylor - - -	Coorg - - -	96
Major W. Agnew - - - -	Assam - - -	139
Mr. V. H. Levinge - - - -	Madura - - -	12
Chief Commissioner of - - -	Nagpore - - -	28
Mr. Fletcher - - - -	Ootacamund - - -	24
Gool Mahomed - - - -	- ditto - - -	20
General McCleverty - - - -	New Zealand - - -	23
Mr. W. Robinson - - - -	Kotagherry - - -	30
Mr. Crake - - - -	Wynad - - -	12
Mr. H. R. Dawson - - - -	Seegoor - - -	12

The number of plants issued to the public during the month is 168, making the total number of plants distributed 81,066.

TABLE IV.—Register of Chinchona Plants Distributed—*continued*.

NAMES.	STATION.	Number of Plants.	REMARKS.
Captain Mann	Coorg	48	
Mr. E. Roberts	ditto	530	
Mr. H. Russell	Wynad	12	
Reverend — Wait	Coonoor	2	
Collector of Belgaum	Belgaum	28	
Collector of Honore	Honore	28	
Dr. Ross	ditto	15	
His Excellency the Governor	Bombay	158	
Mr. H. Hinde	Wynad	12	
„ E. B. Thomas	Coonoor	12	
Rajah of Poonganoor	Poonganoor	12	
Major Grant	Wellington	226	
Messrs. Thomson, Shaw & Co.	Poonganoor	28	
Mr. J. H. Trinson	ditto	31	
Dr. Muller	Melbourne	28	
Mr. Tyrrell	Mysore	12	
Dr. Sayers	Vellore	12	
Major C. P. Taylor	Ootacamund	5,250	
Doctor Wilson	ditto	6	
Mr. Schnarrie	ditto	15,000	
Captain Fuller	Coonoor	417	
Dr. Drummond	Ootacamund	224	
Captain Jennings	ditto	1,756	
Lieut. H. B. Montmorency	Bangalore	6	
Mr. M ^h Hutchin	Ootacamund	3	
Colonel Molesworth	ditto	6	
Mr. C. Gray	Coonoor	12	
„ H. B. Leddell	Ootacamund	12	
„ Minchin	Wynad	1,600	
His Excellency the Governor	Vizagapatam	35	
Mr. R. F. Phillips	Kotagerry	1,117	
Colonel Cooke	ditto	24	
Mr. G. J. Glasson	Wynad	1,000	
Dr. Macpherson	Mercara	400	
Mr. W. H. Kerr	Coorg	3,100	
„ James	Ootacamund	1,000	
Colonel Whish	Bengal	82	
Mr. K. Mair	Caleutta	1,180	
„ W. Shakespear	ditto	61	
„ E. E. Meakin	ditto	168	
„ C. Ackland	ditto	150	
„ K. M ^h Iver	ditto	124	
„ Havelock	Ootacamund	12	
„ H. de Facien	Kartairy	6,821	
Major Sweet	ditto	102	
Captain Campbell	Bangalore	6	
Royal Gardens	Mauritius	36	
Honourable W. R. Arbuthnot	Wynad	93	
Mr. H. Maxwell	Bombay	50	
Mrs. C. Smith	Wynad	22	
Captain Beckley	Wellington	200	
Mr. Walsh	Salem	100	
His Excellency the Governor General	Java	175	
Captain Richardson	Kulhutti	381	
Rajah of Poonganoor	Poonganoor	24	
His Excellency the Governor	Madras	24	
Mr. J. W. B. Money	Ootacamund	25,000	
Captain Mitcheson	ditto	50	
Mr. R. H. Elliot	Munjerabad	157	
His Excellency the Governor General	Goa	252	
Colonel Phayre	Rangoon	152	
Mr. Ryall	Kotagerry	24	
„ J. Gordon	Coonoor	1,529	
„ J. Rohde	Neddivuttum	100	
„ J. Higginbotham	Goodaloor	12	
„ S. Pitol	Mauritius	36	
„ J. Horne	ditto	36	
M. Edouard Cremary	Reunion	51	
For the French Government	Algiers	45	
TOTAL Number of Plants		81,066	

Ootacamund,
September 1865.

(signed) *W. G. McIvor*,
Superintendent, Government Chinchona Plantations.

— No. 62. —

From the Government of Madras to the Secretary of State in Council.

Madras, 26 October 1865.

WE have the honour to forward, for your information, the accompanying Tabular Report on the number, condition, &c., of the Chinchona plants on the Neilgherries, on the 30th September 1865.

Enclosure in No 62.

REPORT on the Number, Distribution, and Condition of Chinchona Plants on the Neilgherries, on the 30th September 1865.

No. of Species.	Botanical Names.	Commercial Names.	Number of Plants.	Value per Lb. of Dry Bark in the London Market.	REMARKS.
1	<i>C. succirubra</i> - -	Red Bark - -	221,280	<i>s. d.</i> 2 6 to 8 9	The number of plants planted out in the plantation remain the same as in last month, namely, 244,871. The increase by propagation is 78,725, being 37,815 plants above the average of the last six months, making the total number of plants 775,153.
2	<i>C. calisaya</i> , var. <i>Fru-tex</i> , var. <i>Vera</i> .	Yellow Bark - -	3,138	2 10 to 7 -	
3	<i>C. officinalis</i> , var. <i>Condamenia</i> (<i>C. Uritu-singa</i>).	Original Loxa Bark	8,489	2 10 to 7 -	
4	<i>C. officinalis</i> , var. <i>Bonplandiana</i> (<i>C. Chahuarguera</i>).	Select Crown Bark -	509,021	2 10 to 7 -	
5	<i>C. crespilla</i> - -	Fine Crown Bark -	3,139	2 10 to 6 -	
6	<i>C. lancifolia</i> - -	Pitayo Bark - -	93	1 8 to 2 10	
7	<i>C. nitida</i> - -	Genuine Grey Bark	2,786	1 8 to 2 9	
8	<i>C. Species</i> without name.	Fine Grey Bark -	8,500	1 8 to 2 10	
9	<i>C. micrantha</i> - -	Grey Bark - -	14,893	1 8 to 2 9	
10	<i>C. Peruviana</i> - -	Finest Grey Bark -	3,389	1 8 to 2 10	
11	<i>C. Pahudiana</i> - -	Unknown - -	425	Unknown.	
TOTAL Number of Plants - - -			775,153		

TABLE II.

MEMORANDUM of the Growth of Eleven Plants of *C. succirubra*, planted on the Second Denison Plantation at Neddivuttum, on the 30th August 1862.

Number of Plants.	Height in Inches when Planted, 30 August 1862.	Height in Inches on 31 August 1865.	Height in Inches on 30 September 1865.	Growth in Inches during Sept. 1865.	By Whom Planted.
1	23	124	125½	1½	His Excellency Sir W. Denison.
2	16½	110½	111½	1	
3	19	113	114½	1½	
4	15	105	105½	½	
5	27	125½	126½	1¼	
6	20	100	102	2	J. W. Breeks, Esq.
7	20	113½	114½	1	
8	18	120	121	1	
9	20	121	121½	1½	J. D. Sim, Esq.
10	20	124½	125½	1	Lieutenant M'Leod.
11	18	109	109½	½	P. Grant, Esq.
12	-	70½	72	1½	Plant cut down for bark.

TABLE II. exhibits the growth of 11 plants of *C. succirubra* planted out by his Excellency the Governor, and other gentlemen, at Neddivuttum, on the 30th August 1862. The average growth of these plants during the month is the same as in last month, viz., 1½ inch.

One of the two plants cut down on the 20th March 1863 for the bark submitted to Mr. Howard for analysis, has made strong shoots of 72 inches in height, giving the growth of 1½ inch during the month.

TABLE III.

SHOWING the Height of Twelve Plants of *C. officinalis*, planted on the Dodabetta Plantation at Ootacamund, on the 30th September 1863.

Number of Plants.	Height in Inches when Planted, 30 September 1863.	Height in Inches on 31 August 1865.	Height in Inches on 30 September 1865.	Growth in Inches during September 1865.	REMARKS.
1	19	92 $\frac{1}{2}$	96	3 $\frac{1}{2}$	The 12 plants of <i>C. officinalis</i> (a shrubby species) on the Dodabetta plantation, gives an average growth of 3 $\frac{5}{8}$ inches, or about half an inch under the growth of last month.
2	14 $\frac{1}{2}$	86	89	3	
3	23	94 $\frac{1}{2}$	97	2 $\frac{1}{2}$	
4	22	90 $\frac{1}{2}$	93 $\frac{1}{2}$	3	
5	21 $\frac{1}{2}$	93 $\frac{1}{2}$	97	3 $\frac{1}{2}$	
6	28	105 $\frac{1}{2}$	109 $\frac{1}{2}$	4	
7	22 $\frac{1}{2}$	89 $\frac{1}{2}$	92	2 $\frac{1}{2}$	
8	21 $\frac{1}{2}$	87 $\frac{1}{2}$	90 $\frac{1}{2}$	3	
9	21 $\frac{1}{2}$	97 $\frac{1}{2}$	101	3 $\frac{1}{2}$	
10	19 $\frac{1}{2}$	90 $\frac{1}{2}$	94	3 $\frac{1}{2}$	
11	24	97	100	3	
12	24	96	99 $\frac{1}{2}$	3 $\frac{1}{2}$	

TABLE IV.

REGISTER of Chinchona Plants Distributed.

NAMES.	STATION.	Number of Plants.
Mr. F. N. Maltby - - -	Travancore - - -	16
Dr. Junghuhn - - -	Java - - -	56
Mr. A. R. Lascelles - - -	Ootacamund - - -	12
Mr. M. Anderson - - -	Jamaica - - -	2
Dr. Wiche - - -	Bombay - - -	10
Dr. T. Anderson - - -	Calcutta - - -	554
Dr. Jamieson - - -	Saharanpore - - -	107
Professor Lees - - -	Calcutta - - -	547
Rajah of Travancore - - -	Travancore - - -	521
Major Morgan - - -	Ootacamund - - -	1,534
Mr. E. T. Fitzgerald - - -	Calcutta - - -	558
Mr. J. W. B. Money - - -	ditto - - -	1,369
Mr. W. Bourne - - -	ditto - - -	532
Captain Cox - - -	Wynad - - -	6
Mr. Hollock - - -	ditto - - -	2
Mr. T. Sheffield - - -	Ootacamund - - -	12
Dr. F. Day - - -	Cochin - - -	100
Mr. Brown - - -	Tellicherry - - -	12
Mr. J. Hall - - -	Ootacamund - - -	144
Mr. T. Knop - - -	ditto - - -	18
Captain Lees - - -	Bengal - - -	281
Mr. W. H. Rayne - - -	Manantoddy - - -	424
Rev. — Sawyer - - -	Ootacamund - - -	1,018
Mr. Frend - - -	ditto - - -	512

The number of plants issued to the public during the month is 425, making the total number of plants distributed 81,491.

TABLE IV.—Register of Chinchona Plants Distributed—*continued.*

NAMES.	STATION.	Number of Plants.	REMARKS.
Mr. Hollock - - - -	Ootacamund - -	1	
Mr. J. Pierie - - - -	Seegoor - - -	12	
Colonel Scott - - - -	Ootacamund - -	1,236	
Mr. Berend - - - -	Cachar - - -	275	
Rev. J. Hunter - - - -	Coonoor - - -	12	
Mr. J. Mullaly - - - -	ditto - - -	24	
Mr. W. H. Stanes - - - -	ditto - - -	1,262	
Colonel R. Cooper - - - -	Kotagherry - -	12	
Mr. F. Cockburn - - - -	ditto - - -	12	
Colonel Woodfall - - - -	Coonoor - - -	12	
Mr. C. Anderson - - - -	ditto - - -	24	
Colonel Angelo - - - -	Ootacamund - -	12	
Rev. E. Laseon - - - -	ditto - - -	12	
Captain R. N. Taylor - - - -	Coorg - - -	96	
Major W. Agnew - - - -	Assam - - -	139	
Mr. V. H. Levinge - - - -	Madura - - -	12	
Chief Commissioner of - - - -	Nagpore - - -	28	
Mr. Fletcher - - - -	Ootacamund - -	24	
Gool Mahomed - - - -	ditto - - -	20	
General M'Cleverty - - - -	New Zealand - -	23	
Mr. W. Robinson - - - -	Kotagherry - -	30	
Mr. Crake - - - -	Wynad - - -	12	
Mr. H. R. Dawson - - - -	Seegoor - - -	12	
Captain Mann - - - -	Coorg - - -	48	
Mr. E. Roberts - - - -	ditto - - -	530	
Mr. H. Russell - - - -	Wynad - - -	12	
Reverend — Wait - - - -	Coonoor - - -	2	
Collector of Belgaum - - - -	Belgaum - - -	28	
Collector of Honore - - - -	Honore - - -	28	
Dr. Ross - - - -	ditto - - -	15	
His Excellency the Governor - - - -	Bombay - - -	158	
Mr. H. Hinde - - - -	Wynad - - -	12	
Mr. E. B. Thomas - - - -	Coonoor - - -	12	
Rajah of Poonganoor - - - -	Poonganoor - -	12	
Major Grant - - - -	Wellington - -	226	
Messrs. Thomson, Shaw & Co. - - - -	Poonganoor - -	28	
Mr. J. H. Trinson - - - -	ditto - - -	31	
Dr. Muller - - - -	Melbourne - -	28	
Mr. Tyrrell - - - -	Mysore - - -	12	
Dr. Sayers - - - -	Vellore - - -	12	
Major C. P. Taylor - - - -	Ootacamund - -	5,250	
Dr. Wilson - - - -	ditto - - -	6	
Mr. Schnarrie - - - -	ditto - - -	15,000	
Captain Fuller - - - -	Coonoor - - -	417	
Dr. Drummond - - - -	Ootacamund - -	224	
Captain Jennings - - - -	ditto - - -	1,756	
Lieut. H. B. Montmorency - - - -	Bangalore - - -	6	
Mr. M'Hutchin - - - -	Ootacamund - -	3	
Colonel Molesworth - - - -	ditto - - -	6	
Mr. C. Gray - - - -	Coonoor - - -	12	
Mr. H. B. Leddell - - - -	Ootacamund - -	12	
Mr. Minchin - - - -	Wynad - - -	1,600	
His Excellency the Governor - - - -	Vizagapatam - -	35	
Mr. R. F. Phillips - - - -	Kotagherry - -	1,117	
Colonel Cooke - - - -	ditto - - -	24	
Mr. G. J. Glasson - - - -	Wynad - - -	1,000	
Dr. Macpherson - - - -	Mercara - - -	400	
Mr. W. H. Kerr - - - -	Coorg - - -	3,100	
Mr. James - - - -	Ootacamund - -	1,000	

TABLE IV.—Register of Chinchona Plants Distributed—*continued*.

NAMES.	STATION.	Number of Plants.	REMARKS.
Colonel Whish - - - -	Bengal - - -	82	
Mr. K. Mair - - - -	Calcutta - - -	1,180	
Mr. W. Shakespear - - -	ditto - - -	61	
Mr. E. E. Meakin - - -	ditto - - -	168	
Mr. C. Ackland - - - -	ditto - - -	150	
Mr. K. M'Iver - - - -	ditto - - -	124	
Mr. Havelock - - - -	Ootacamund - -	12	
Mr. H. de Facien - - -	Kartairy - - -	6,821	
Major Sweet - - - -	ditto - - -	102	
Captain Campbell - - -	Bangalore - - -	6	
Royal Gardens - - - -	Mauritius - - -	36	
Honourable W. R. Arbuthnot - - -	Wynad - - -	93	
Mr. H. Maxwell - - - -	Bombay - - -	50	
Mrs. C. Smith - - - -	Wynad - - -	22	
Captain Beckley - - - -	Wellington - -	200	
Mr. Walsh - - - -	Salem - - -	100	
His Excellency the Governor General	Java - - -	175	
Captain Richardson - - -	Kulbutty - - -	381	
Rajah of Poonganoor - - -	Poonganoor - -	24	
His Excellency the Governor - - -	Madras - - -	24	
Mr. J. W. B. Money - - -	Ootacamund - -	25,000	
Captain Mitcheson - - -	ditto - - -	50	
Mr. R. H. Elliot - - - -	Munjerabad - -	157	
His Excellency the Governor General	Goa - - -	252	
Colonel Payre - - - -	Rangoon - - -	152	
Mr. Ryall - - - -	Kotagherry - -	24	
Mr. J. Gordon - - - -	Coonoor - - -	1,579	
Mr. J. Rohde - - - -	Neddivuttum - -	100	
Mr. J. Higginbotham - - -	Goodaloor - - -	12	
Mr. S. Pitol - - - -	Mauritius - - -	36	
Mr. J. Horne - - - -	ditto - - -	36	
M. Edward Cremary - - -	Reunion - - -	51	
For the French Government - - -	Algiers - - -	45	
Mr. J. B. Norton - - - -	Shevaroys - - -	50	
Mr. T. H. Rossall - - - -	Wynad - - -	40	
Mr. Mackay - - - -	Punjab - - -	50	
Mr. W. Forsyth - - - -	Central Provinces -	169	
Colonel Cadell - - - -	Coorg - - -	62	
Mr. J. L. Browning - - -	Wynad - - -	4	
TOTAL Number of Plants - - -		81,491	

Ootacamund,
13 October 1865.

(signed) *W. G. McIvor*,
Superintendent, Government Chinchona Plantations.

— No. 63. —

From the Government of Madras to the Secretary of State for India.

Madras, 27 November 1865.

WE have the honour to forward, for your information, the accompanying Tabular Report on the number, condition, &c., of the Chinchona plants on the Neilgherries, on the 31st October 1865.

Enclosure in No. 63.

REPORT on the Number, Distribution, and Condition of Chinchona Plants on the Neilgherries, on the 31st October 1865.

No. of Species.	Botanical Names.	Commercial Names.	Number of Plants.	Value per Lb. of Dry Bark in the London Market.	REMARKS.
1	<i>C. succirubra</i> - -	Red Bark - -	249,054	s. d. 2 6 to 8 9	The number of plants planted out in the plantations remain the same as last month, namely, 244,871. The increase by propagation is 78,715, being 37,501 above the average of the last six months, making the total number of plants 853,550.
2	<i>C. calisaya</i> , var. <i>Fru-</i> <i>tex</i> , var. <i>Vera</i> .	Yellow Bark - -	3,156	2 10 to 7 -	
3	<i>C. officinalis</i> , var. <i>Con-</i> <i>damenia</i> (<i>C. Uritu-</i> <i>singa</i>).	Original Loxa Bark	8,489	2 10 to 7 -	
4	<i>C. officinalis</i> , var. <i>Bon-</i> <i>plandiana</i> (<i>C. Cha-</i> <i>huarguera</i>).	Select Crown Bark -	559,081	2 10 to 7 -	
5	<i>C. crespilla</i> - -	Fine Crown Bark -	3,649	2 10 to 6 -	
6	<i>C. lancifolia</i> - -	Pitayo Bark - -	128	1 8 to 2 10	
7	<i>C. nitida</i> - -	Genuine Grey Bark	2,786	1 8 to 2 9	
8	<i>C. Species</i> without name.	Fine Grey Bark -	8,500	1 8 to 2 10	
9	<i>C. micrantha</i> - -	Grey Bark - -	14,893	1 8 to 2 9	
10	<i>C. Peruviana</i> - -	Finest Grey Bark -	3,889	1 8 to 2 10	
11	<i>C. Pahudiana</i> - -	Unknown - -	425	Unknown.	
TOTAL Number of Plants - - -			853,550		

TABLE II.

MEMORANDUM of the Growth of Eleven Plants of *C. succirubra*, planted on the Second Denison Plantation at Neddivuttum, on the 30th August 1862.

Number of Plants.	Height in Inches when Planted, 30 August 1862.	Height in Inches on 30 September 1865.	Height in Inches on 31 October 1865.	Growth in Inches during October 1865.	By whom Planted.
1	23	125½	129	3½	His Excellency Sir W. Denison. J. W. Brecks, Esq. Dr. Sanderson. J. D. Sim, Esq. Lieutenant M^r Leod. P. Grant, Esq. Plant cut down for bark.
2	16½	111½	114	2½	
3	19	114½	114½	-	
4	15	105¾	109	3¼	
5	27	126½	132	5½	
6	20	102	106½	4½	
7	20	114½	118	3½	
8	18	121	123	2	
9	20	121½	127	5½	
10	20	125½	127½	1¾	
11	18	109¾	110½	¾	
12	-	72	76½	4½	

TABLE II. exhibits the growth of 11 plants of *C. succirubra* planted out by his Excellency the Governor, and other gentlemen, at Neddivuttum, on the 30th August 1862. The average growth of these plants during the month is near 3 inches, or 1½ inch above that of last month.

One of the two plants cut down on the 20th of March 1863 for the bark submitted to Mr. Howard for analysis, has made strong shoots of 76½ inches in height, giving the growth of 4½ inches during the month.

TABLE III.

SHOWING the Height of Twelve Plants of *C. officinalis*, planted on the Dodabetta Plantation at Ootacamund, on the 30th September 1863.

Number of Plants.	Height in Inches when Planted, 30 September 1863.	Height in Inches on 30 September 1865.	Height in Inches on 31 October 1865.	Growth in Inches during October 1865.	REMARKS.
1	19	96	100	4	The 12 plants of <i>C. officinalis</i> (a shrubby species) on the Dodabetta Plantation, gives an average growth of $3\frac{7}{12}$ inches, or $\frac{3}{8}$ ths of an inch above the growth of last month.
2	$14\frac{1}{2}$	89	$91\frac{1}{2}$	$2\frac{1}{2}$	
3	28	97	101	4	
4	22	$93\frac{1}{2}$	97	$3\frac{1}{2}$	
5	$21\frac{1}{2}$	97	$99\frac{1}{2}$	$2\frac{1}{2}$	
6	28	$109\frac{1}{2}$	$113\frac{1}{2}$	4	
7	$22\frac{1}{2}$	92	$95\frac{1}{2}$	$3\frac{1}{2}$	
8	$21\frac{1}{2}$	$90\frac{1}{2}$	$94\frac{1}{2}$	4	
9	$21\frac{1}{2}$	101	105	4	
10	$19\frac{1}{2}$	94	$98\frac{1}{2}$	$4\frac{1}{2}$	
11	24	100	$103\frac{1}{2}$	$3\frac{1}{2}$	
12	24	$99\frac{1}{2}$	$102\frac{1}{2}$	3	

TABLE IV.

REGISTER of Chinchona Plants Distributed.

NAMES.	STATION.	Number of Plants.
Mr. F. N. Maltby - - -	Travancore - - -	16
Dr. Junghuhn - - -	Java - - -	56
Mr. A. R. Lascelles - - -	Ootacamund - - -	12
Mr. M. Anderson - - -	Jamaica - - -	2
Dr. Wiche - - -	Bombay - - -	10
Dr. T. Anderson - - -	Calcutta - - -	554
Dr. Jamieson - - -	Saharanpore - - -	107
Professor Lees - - -	Calcutta - - -	547
Rajah of Travancore - - -	Travancore - - -	521
Major Morgan - - -	Ootacamund - - -	1,534
Mr. E. T. Fitzgerald - - -	Calcutta - - -	558
Mr. J. W. B. Money - - -	ditto - - -	1,369
Mr. W. Bourne - - -	ditto - - -	532
Captain Cox - - -	Wynad - - -	6
Mr. Hollock - - -	ditto - - -	2
Mr. T. Sheffield - - -	Ootacamund - - -	12
Dr. F. Day - - -	Cochin - - -	100
Mr. Brown - - -	Tellicherry - - -	12
Mr. J. Hall - - -	Ootacamund - - -	144
Mr. T. Knop - - -	ditto - - -	18
Captain Lees - - -	Bengal - - -	281
Mr. W. H. Rayne - - -	Manantoddy - - -	424
Rev. — Sawyer - - -	Ootacamund - - -	1,018
Mr. Frend - - -	ditto - - -	512

The number of plants issued to the public during the month is 318, making the total number of plants distributed 81,809.

TABLE IV.—Register of Chinchona Plants Distributed—*continued*.

NAMES.	STATION.	Number of Plants.	REMARKS.
Mr. Hollock - - - -	Ootacamund - -	1	
Mr. J. Pierie - - - -	Seegoor - - -	12	
Colonel Scott - - - -	Ootacamund - -	1,236	
Mr. Berend - - - -	Cachar - - -	275	
Rev. J. Hunter - - - -	Coonoor - - -	12	
Mr. J. Mullaly - - - -	ditto - - -	24	
Mr. W. H. Stanes - - - -	ditto - - -	1,262	
Colonel R. Cooper - - - -	Kotagherry - -	12	
Mr. F. Cockburn - - - -	ditto - - -	12	
Colonel Woodfall - - - -	Coonoor - - -	12	
Mr. C. Anderson - - - -	ditto - - -	24	
Colonel Angelo - - - -	Ootacamund - -	12	
Rev. E. Laseron - - - -	ditto - - -	12	
Captain R. N. Taylor - - - -	Coorg - - -	96	
Major W. Agnew - - - -	Assam - - -	139	
Mr. V. H. Levinge - - - -	Madura - - -	12	
Chief Commissioner of - - - -	Nagpore - - -	28	
Mr. Fletcher - - - -	Ootacamund - -	24	
Gool Mahomed - - - -	ditto - - -	20	
General M'Cleverty - - - -	New Zealand - -	23	
Mr. W. Robinson - - - -	Kotagherry - -	30	
Mr. Crake - - - -	Wynad - - -	12	
Mr. H. R. Dawson - - - -	Seegoor - - -	12	
Captain Mann - - - -	Coorg - - -	48	
Mr. E. Roberts - - - -	ditto - - -	530	
Mr. H. Russell - - - -	Wynad - - -	52	
Rev. — Wait - - - -	Coonoor - - -	2	
Collector of Belgaum - - - -	Belgaum - - -	28	
Collector of Honore - - - -	Honore - - -	28	
Dr. Ross - - - -	ditto - - -	15	
His Excellency the Governor - - - -	Bombay - - -	158	
Mr. H. Hinde - - - -	Wynad - - -	12	
Mr. E. B. Thomas - - - -	Coonoor - - -	12	
Rajah of Poonganoor - - - -	Poonganoor - -	12	
Major Grant - - - -	Wellington - -	226	
Messrs. Thomson, Shaw & Co. - - - -	Poonganoor - -	28	
Mr. J. H. Trinson - - - -	ditto - - -	31	
Dr. Muller - - - -	Melbourne - -	28	
Mr. Tyrrell - - - -	Mysore - - -	12	
Dr. Sayers - - - -	Vellore - - -	12	
Major C. P. Taylor - - - -	Ootacamund - -	5,250	
Dr. Wilson - - - -	ditto - - -	6	
Mr. Schnarrie - - - -	ditto - - -	15,000	
Captain Fuller - - - -	Coonoor - - -	417	
Dr. Drummond - - - -	Ootacamund - -	224	
Captain Jennings - - - -	ditto - - -	1,756	
Lieut. H. B. Montmorency - - - -	Bangalore - -	6	
Mr. M'Hutchin - - - -	Ootacamund - -	3	
Colonel Molesworth - - - -	ditto - - -	6	
Mr. C. Gray - - - -	Coonoor - - -	12	
Mr. H. B. Leddell - - - -	Ootacamund - -	12	
Mr. Minchin - - - -	Wynad - - -	1,600	
His Excellency the Governor - - - -	Vizagapatam - -	35	
Mr. R. F. Phillips - - - -	Kotagherry - -	1,117	
Colonel Cooke - - - -	ditto - - -	24	
Mr. G. J. Glasson - - - -	Wynad - - -	1,000	
Dr. Macpherson - - - -	Mercara - - -	400	
Mr. W. H. Kerr - - - -	Coorg - - -	3,100	
Mr. James - - - -	Ootacamund - -	1,000	
Colonel Whish - - - -	Bengal - - -	82	

TABLE IV.—Register of Chinchona Plants Distributed—*continued*.

NAMES.	STATION.	Number of Plants.	REMARKS.
Mr. K. Mair - - - -	Calcutta - - - -	1,180	
Mr. W. Shakespear - - - -	ditto - - - -	61	
Mr. E. Meakin - - - -	ditto - - - -	168	
Mr. C. Acland - - - -	ditto - - - -	150	
Mr. K. McIver - - - -	ditto - - - -	124	
Mr. Havelock - - - -	Ootacamund - - - -	12	
Mr. H. de Facien - - - -	Kartairy - - - -	6,821	
Major Sweet - - - -	ditto - - - -	102	
Captain Campbell - - - -	Bangalore - - - -	6	
Royal Gardens - - - -	Mauritius - - - -	36	
Hon. W. R. Arbuthnot - - - -	Wynad - - - -	93	
Mr. H. Maxwell - - - -	Bombay - - - -	50	
Mrs. C. Smith - - - -	Wynad - - - -	22	
Captain Beckley - - - -	Wellington - - - -	200	
Mr. Walsh - - - -	Salem - - - -	100	
His Excellency the Governor General	Java - - - -	175	
Captain Richardson - - - -	Kulhatty - - - -	509	
Rajah of Poonagoor - - - -	Poonganoor - - - -	24	
His Excellency the Governor - - - -	Madras - - - -	24	
Mr. J. W. B. Money - - - -	Ootacamund - - - -	25,000	
Captain Mitcheson - - - -	ditto - - - -	50	
Mr. R. H. Elliot - - - -	Munjerabad - - - -	157	
His Excellency the Governor General	Goa - - - -	252	
Colonel Phayre - - - -	Rangoon - - - -	152	
Mr. Ryall - - - -	Kotagherry - - - -	24	
Mr. J. Gordon - - - -	Coonoor - - - -	1,651	
Mr. J. Rohde - - - -	Neddivuttum - - - -	100	
Mr. J. Higginbotham - - - -	Goodaloor - - - -	12	
Mr. S. Pitol - - - -	Mauritius - - - -	36	
Mr. J. Horne - - - -	ditto - - - -	36	
M. Edouard Cremary - - - -	Reunion - - - -	51	
For the French Government - - - -	Algiers - - - -	45	
Mr. J. P. Norton - - - -	Shevaroy - - - -	50	
Mr. Mackay - - - -	Punjab - - - -	50	
Mr. W. Forsyth - - - -	Central Province - - - -	169	
Colonel Cadell - - - -	Coorg - - - -	62	
Mr. J. L. Browning - - - -	Wynad - - - -	4	
Mr. H. Leeds - - - -	Burmah - - - -	112	
Maloo Sait - - - -	ditto - - - -	6	
TOTAL Number of Plants - - - -		81,809	

Ootacamund,
November 1865.

(signed) *W. G. McIvor*,
Superintendent, Government Chinchona Plantations.

— No. 64. —

From the Government of Madras to the Secretary of State for India.

Madras, 25 December 1865.

Proceedings of
Government,
21 December 1865.

WITH reference to paragraph 3, of your Despatch, dated 30th September 1865, we have the honour to forward, for your information, the accompanying letter from the Superintendent of the Government Chinchona Plantations, Ootacamund, respecting the treatment necessary for increasing the deposition of quinine in the bark of the chinchona. Our order on this paper, and a letter addressed by us to the Government of India on the subject, are also forwarded.

Enclosure 1, in No. 64.

From the Superintendent, Government Chinchona Plantations, to the Acting Secretary to Government, Revenue Department, Fort St. George.

Ootacamund, 24 November 1865.

1. WITH reference to the recent analysis by J. E. Howard, Esq., of the chinchona bark sent from the Neilgherries in May last, and that gentleman's remark, that our chinchona plants should be encouraged to produce quinine instead of chinchonidine, I would respectfully bring to the notice of Government the treatment necessary to effect this important change in the alkaloids.

2. Chinchona bark may, and frequently does, produce five alkaloids, namely, first, quinine; second, quinidine; third, chinchonidine; fourth, chinchonine; and fifth, aricine. The first of these alkaloids is of the greatest value in commerce, the second and third being rather more than one-half the value of the first, while the fourth and fifth are almost valueless; it is thus that the price of chinchona bark depends entirely on the quantity it contains of the three first alkaloids in a state capable of crystallization; therefore, to increase the quantity of quinine, to the diminution of other alkaloids, is the first and most important object of the cultivator, especially when it is considered that the presence of inferior alkaloids, even though valuable in themselves, add so much to the cost of manufacture, as to render their presence a disadvantage. With these important considerations in view, from the time the chinchona plants were introduced to this country, my attention has been steadily directed to ascertain, by practical observation, how and in what manner the alkaloids are formed; how they increase, and pass from one into another. Although the experiments and observations have been limited, when compared with the importance of the inquiry, still I feel satisfied that this problem has been so far solved, as to place in a great degree under the control of the cultivator, the quantity and quality of the alkaloid produced.

3. Quinine and other alkaloids are first formed or produced in the leaves by the action of light and air on the juices, and while the leaves are performing their usual office of elaborating the sap or juices of the plant. Here the alkaloids are intimately combined with the elements of the sap, such as quinic acid, &c., and in this condition carried down by the return sap, and deposited in the bark, most impure in the liber or inner bark, but as the liber becomes transformed into cellular tissue, a superior alkaloid (quinine) is produced in a state of great purity, and easy of separation. The inferior quality of the alkaloids in the liber is apparently caused by the rapid circulation, in this portion of the bark, of sap containing oxygen, from recent exposure in the leaves. Quinine being most abundant in the cellular tissue of the bark, where it is deposited at first also in an impure state, but in consequence of the retarded and horizontal circulation of the sap in this bark, the tendency of the inferior alkaloids is to pass into quinine. In the cellular tissue, however, there is also a process of waste, caused by the action of light and air on the surface of the bark; thus the quinine apparently oxidizes, becomes inseparably combined with, or passes into red colouring matter and gum. This process of waste is, however, somewhat less than the deposit or accumulation in the bark, and for this reason the alkaloids increase according to the age of the plant.

4. From the above it will be understood, that if this process of oxidation or waste from the surface is effectually prevented, quinine will be deposited and increased in the cellular

cellular tissue of the bark to an almost unlimited extent, because the leaves form the quinine laboratory, while the bark is merely the storehouse; and doubtless the leaves daily elaborate and deposit a certain proportion of quinine, and will continue to do so till the last day that a healthy leaf exists upon the tree; there is, therefore, a continual and never failing alkaloid, producing power in action; and the alkaloid thus formed and deposited can be cheaply and most effectually preserved by covering the surface of the growing bark with any material so as to exclude light and the action of the air. There will, of course, be a limit to the quantity of alkaloid that the cellular tissue will contain, which probably will be from 18 to 25 per cent. of the bulk of the bark, and, making an allowance for the less pure alkaloids of the liber, from 14 to 17 per cent. of pure quinine may be obtained from "Red Bark" thus managed.

5. In addition to protecting the alkaloids from waste, it is desirable to increase the cellular tissue, and to effect both these objects moss has been selected to cover the surface of the bark, as this material effectually excludes the light, and at the same time greatly increases the cellular tissue. By this process the yield of quinine can be tripled, quadrupled, or even more, according to the time the bark is subjected to the process, which, to develop its full advantages, should be applied for a period not less than 18 months, a longer time than this being still more advantageous. This process also gives the advantage of enabling the bark of the stems and branches to be continually removed and renewed, so that in reality the produce from an acre of land will be fully thirty times as much as that which can be obtained by the usual method of cultivation; and in order to procure to myself a participation in the benefit of results so important, I considered it desirable to secure this discovery by patent rights, under Act No. XV. of 1859.

Enclosure 2, in No. 64.

(No. 3084.)

From the Secretary to the Government of Madras to the Secretary to the Government of India.

Revenue Department, Fort St. George,
21 December 1865.

Sir,

IN forwarding the accompanying letter from the Superintendent of the Government Chinchona Plantations, Ootacamund, I am directed to draw the attention of the Government of India to the Superintendent's statement in the last paragraph, that he has applied for a patent for his discovery of the utility of moss in increasing the deposition of quinine in the bark of the chinchona.

I have, &c.
(signed) *J. D. Sim*,
Secretary to Government.

— No. 65. —

From the Government of Madras to the Secretary of State for India.

Madras, 25 December 1865.

* Proceedings of
Government,
22 December 1865.

WE have the honour to forward for your information the accompanying Tabular Report* on the number, condition, &c., of the Chinchona plants on the Neilgherries on the 30th November 1865.

Enclosure in No. 65.

Report on the Number, Distribution, and Condition of Chinchona Plants on the Neilgherries, on the 30th November 1865.

No. of Species.	Botanical Names.	Commercial Names.	Number of Plants.	Value per Lb. of Dry Bark in the London Market.	REMARKS.
				s. d. s. d.	
1	<i>C. succirubra</i> - -	Red Bark - -	2,62,927	2 6 to 8 9	The number of plants planted out in the plantations remain the same as in last month, namely, 2,44,871. The increase by propagation is 36,171, being 13,603 under the average of the last six months, making the total number of plants 8,87,854.
2	<i>C. Calisaya</i> , var. frutex, var vera.	Yellow Bark - -	3,156	2 10 to 7 -	
3	<i>C. officinalis</i> , var. Condemenia (<i>C. Uritusinga</i>).	Original Loxa Bark -	8,189	2 10 to 7 -	
4	<i>C. officinalis</i> , var. Bonplandiana (<i>C. Chahuarguera</i>).	Select Crown Bark -	5,79,581	2 10 to 7 -	
5	<i>C. crespilla</i> - -	Fine Crown Bark -	3,849	2 10 to 6 -	
6	<i>C. lancifolia</i> - -	Pitayo Bark - -	159	1 8 to 2 10	
7	<i>C. nitida</i> - -	Genuine Grey Bark -	2,786	1 8 to 2 9	
8	<i>C. species</i> without name.	Fine Grey Bark -	8,500	1 8 to 2 10	
9	<i>C. micrantha</i> - -	Grey Bark - -	14,893	1 8 to 2 9	
10	<i>C. Peruviana</i> - -	Finest Grey Bark -	3,389	1 8 to 2 10	
11	<i>C. Pahudiana</i> - -	Unknown - -	425	Unknown.	
TOTAL Number of Plants - - -			8,87,854		

TABLE II.

MEMORANDUM of the Growth of Eleven Plants of *C. succirubra*, planted on the Second Denison Plantation, at Neddivuttum, on the 30th August 1862.

Number of Plants.	Height in Inches when Planted on 30 August 1862.	Height in Inches on 31 October 1865.	Height in Inches on 30 November 1865.	Growth in Inches during November 1865.	By whom planted.
1	23	129	129 $\frac{3}{4}$	$\frac{3}{4}$	His Excellency Sir W. Denison. J. W. Breeks, Esq. Dr. Sanderson. J. D. Sim, Esq. Lieutenant McLeod. P. Grant, Esq. Plant cut down for bark.
2	16 $\frac{1}{2}$	114	115 $\frac{1}{2}$	1 $\frac{1}{2}$	
3	19	114 $\frac{1}{2}$	116 $\frac{1}{2}$	2	
4	15	109	110 $\frac{1}{2}$	1 $\frac{1}{2}$	
5	27	132	134	2	
6	20	106 $\frac{1}{2}$	107 $\frac{1}{4}$	$\frac{3}{4}$	
7	20	118	119	1	
8	18	123	123 $\frac{3}{4}$	$\frac{3}{4}$	
9	20	127	128	1	
10	20	127 $\frac{1}{4}$	129	1 $\frac{3}{4}$	
11	18	110 $\frac{1}{2}$	111	$\frac{1}{2}$	
12	-	76 $\frac{1}{2}$	78 $\frac{1}{2}$	2	

Table II. exhibits the growth of eleven plants of *C. succirubra*, planted out by his Excellency the Governor and other gentlemen at Neddivuttum on the 30th August 1862. The average growth of these plants during the month is 1 $\frac{5}{8}$ inches, or 1 $\frac{1}{2}$ inches under that of last month.

TABLE III.

SHOWING the Height of 12 Plants of *C. officinalis*, planted on the Dodabetta Plantation at Ootacamund, on the 30th September 1863.

Number of Plants.	Height in Inches when Planted, on 30 September 1863.	Height in Inches on 31 October 1865.	Height in Inches on 30 November 1865.	Growth in Inches during November 1865.	REMARKS.
1	19	100	103½	3½	The 12 plants of <i>C. officinalis</i> , (a shrubby species) on the Dodabetta plantation, gives an average growth of 3½ inches, or ½ an inch under the growth of last month.
2	14½	91½	93	1½	
3	28	101	103½	2½	
4	22	97	101	4	
5	21½	99½	103½	4	
6	28	113½	117	3½	The seeds of the different species are making satisfactory progress, and a large harvest, especially of <i>C. succirubra</i> seed, may be expected in February and March.
7	22½	95½	98½	3	
8	21½	94½	97	2½	
9	21½	105	109½	4½	
10	19½	98½	101½	3	
11	24	103½	106	2½	
12	24	102½	105	2½	

TABLE IV.

REGISTER of Chincona Plants Distributed.

NAMES.	STATION.	Number of Plants.	
Mr. F. N Maltby - - - -	Travancore - - -	16	The number of plants issued to the public during the month is 1,867, making the total number of plants distributed 83,676.
Dr. Junghun - - - -	Java - - -	56	
Mr. A. R. Lascelles - - - -	Ootacamund - - -	12	
Mr. M. Anderson - - - -	Jamaica - - -	2	
Dr. Wiche - - - -	Bombay - - -	10	
Dr. T. Anderson - - - -	Calcutta - - -	554	
Dr. Jamieson - - - -	Saharanpore - - -	107	
Professor Lees - - - -	Calcutta - - -	547	
Rajah of Travancore - - - -	Travancore - - -	521	
Major Morgan - - - -	Ootacamund - - -	1,534	
Mr. E. T. Fitzgerald - - - -	Calcutta - - -	558	
Mr. J. W. B. Money - - - -	ditto - - -	1,369	
Mr. W. Bourne - - - -	ditto - - -	532	
Captain Cox - - - -	Wynad - - -	6	
Mr. Hollock - - - -	ditto - - -	2	
Mr. T. Sheffield - - - -	Ootacamund - - -	12	
Mr. F. Day - - - -	Cochin - - -	100	
Mr. Brown - - - -	Tellicherry - - -	12	
Mr. J. Hall - - - -	Ootacamund - - -	144	
Mr. T. Knop - - - -	ditto - - -	18	
Captain Lees - - - -	Bengal - - -	231	
Mr. W. H. Rayne - - - -	Manantoddy - - -	424	
Rev. — Sawyer - - - -	Ootacamund - - -	1,018	
Mr. Frend - - - -	ditto - - -	512	

TABLE IV.—Register of Chinchona Plants Distributed—*continued.*

NAMES.	STATION.	Number of Plants.	REMARKS.
Mr. Hollock - - - - -	Ootacamund - - -	1	
Mr. J. Pierie - - - - -	Seegoor - - - - -	12	
Colonel Scott - - - - -	Ootacamund - - -	1,236	
Mr. Berend - - - - -	Cachar - - - - -	275	
Rev. J. Hunter - - - - -	Coonoor - - - - -	12	
Mr. J. Mullaly - - - - -	ditto - - - - -	24	
Mr. W. H. Stanes - - - - -	ditto - - - - -	1,262	
Colonel R. Cooper - - - - -	Kotagherry - - -	12	
Mr. F. Cockburn - - - - -	ditto - - - - -	12	
Colonel Woodfall - - - - -	Coonoor - - - - -	12	
Mr. C. Anderson - - - - -	ditto - - - - -	24	
Colonel Angelo - - - - -	Ootacamund - - -	12	
Rev. E. Laseron - - - - -	ditto - - - - -	12	
Captain R. N. Taylor - - - - -	Coorg - - - - -	96	
Major W. Agnew - - - - -	Assam - - - - -	139	
Mr. V. H. Levinge - - - - -	Madura - - - - -	12	
Chief Commissioner of - - - - -	Nagpore - - - - -	23	
Mr. Fletcher - - - - -	Ootacamund - - -	24	
Gool Mahomed - - - - -	ditto - - - - -	20	
General McCleverty - - - - -	New Zealand - - -	23	
Mr. W. Robinson - - - - -	Kotagherry - - -	330	
Mr. Crake - - - - -	Wynad - - - - -	12	
Mr. H. R. Dawson - - - - -	Seegoor - - - - -	12	
Captain Mann - - - - -	Coorg - - - - -	48	
Mr. E. Roberts - - - - -	ditto - - - - -	530	
Mr. H. Russell - - - - -	Wynad - - - - -	52	
Reverend Wait - - - - -	Coonoor - - - - -	2	
Collector of Belgaum - - - - -	Belgaum - - - - -	28	
Collector of Honore - - - - -	Honore - - - - -	28	
Dr. Ross - - - - -	ditto - - - - -	15	
His Excellency the Governor - - - - -	Bombay - - - - -	158	
Mr. H. Hinde - - - - -	Wynad - - - - -	12	
Mr. E. B. Thomas - - - - -	Coonoor - - - - -	74	
Rajah of Poonganoor - - - - -	Poonganoor - - -	12	
Major Grant - - - - -	Wellington - - -	226	
Messrs. Thomson, Shaw, & Co. - - - - -	Poonganoor - - -	28	
Mr. J. H. Trinson - - - - -	ditto - - - - -	31	
Dr. Muller - - - - -	Melbourne - - -	28	
Mr. Tyrrell - - - - -	Mysore - - - - -	12	
Dr. Sayers - - - - -	Vellore - - - - -	12	
Major C. P. Taylor - - - - -	Ootacamund - - -	5,250	
Doctor Wilson - - - - -	ditto - - - - -	6	
Mr. Schnarrie - - - - -	ditto - - - - -	15,000	
Captain Fuller - - - - -	Coonoor - - - - -	417	
Dr. Drummond - - - - -	Ootamacund - - -	224	
Captain Jennings - - - - -	ditto - - - - -	1,756	
Lieutenant H. B. Montmorency - - - - -	Bangalore - - -	6	
Mr. McHutchin - - - - -	Ootacamund - - -	3	
Colonel Molesworth - - - - -	ditto - - - - -	6	
Mr. C. Gray - - - - -	Coonoor - - - - -	12	
Mr. H. B. Leddell - - - - -	Ootacamund - - -	12	
Mr. Minchin - - - - -	Wynad - - - - -	1,600	
His Excellency the Governor - - - - -	Vizagapatam - - -	35	
Mr. R. F. Phillips - - - - -	Kotagherry - - -	1,117	
Colonel Cooke - - - - -	ditto - - - - -	24	
Mr. G. J. Glasson - - - - -	Wynad - - - - -	1,000	
Dr. Macpherson - - - - -	Mercara - - - - -	400	
Mr. W. H. Kerr - - - - -	Coorg - - - - -	3,100	
Mr. James - - - - -	Ootacamund - - -	1,000	
Colonel Whish - - - - -	Bengal - - - - -	82	

TABLE IV.—Register of Chinchona Plants Distributed—*continued*.

NAMES.	STATION.	Number of Plants.	REMARKS.
Mr. K. Mair - - - -	Calcutta - - -	1,180	
Mr. W. Shakespear - - - -	ditto - - -	61	
Mr. E. E. Meakin - - - -	ditto - - -	168	
Mr. C. Ackland - - - -	ditto - - -	150	
Mr. K. McIver - - - -	ditto - - -	124	
Mr. Havelock - - - -	Ootacamund - -	12	
M. H. de Facein - - - -	Kartairy - - -	6,821	
Major Sweet - - - -	ditto - - -	910	
Captain Campbell - - - -	Bangalore - -	6	
Royal Gardens - - - -	Mauritius - -	36	
Honourable W. R. Arbuthnot - - - -	Wynad - - -	93	
Mr. H. Maxwell - - - -	Bombay - - -	50	
Mrs. C. Smith - - - -	Wynad - - -	316	
Captain Beckley - - - -	Wellington - -	200	
Mr. Walsh - - - -	Salem - - -	100	
His Excellency the Governor General	Java - - -	175	
Captain Richardson - - - -	Kulhatty - - -	509	
Rajah of Poonganoor - - - -	Poonganoor - -	24	
His Excellency the Governor - - - -	Madras - - -	24	
Mr. J. W. B. Money - - - -	Ootacamund - -	25,000	
Captain Mitcheson - - - -	ditto - - -	50	
Mr. R. H. Elliot - - - -	Munjerabad - -	157	
His Excellency the Governor General	Goa - - -	252	
Colonel Phayre - - - -	Rangoon - - -	152	
Mr. Ryall - - - -	Kotagherry - -	24	
Mr. J. Gordon - - - -	Coonoor - - -	1,701	
Mr. J. Rohde - - - -	Neddivuttum - -	100	
Mr. J. Higginbotham - - - -	Goodaloor - -	12	
Mr. S. Pitol - - - -	Mauritius - - -	36	
Mr. J. Horne - - - -	ditto - - -	36	
M. Edouard Cremary - - - -	Reunion - - -	51	
For the French Government	Algiers - - -	45	
Mr. J. B. Norton - - - -	Shevaroy - - -	50	
Mr. Mackay - - - -	Punjab - - -	50	
Mr. W. Forsyth - - - -	Central Provinces - -	169	
Colonel Cadell - - - -	Coorg - - -	62	
Mr. J. L. Browning - - - -	Wynad - - -	4	
Mr. H. Leeds - - - -	Burmah - - -	112	
Maloo Sait - - - -	ditto - - -	6	
Mr. A. D. Brown - - - -	Dimhatty - - -	53	
Mr. J. C. Misquith - - - -	Ootacamund - -	300	
TOTAL Number of Plants - - -		83,676	

Ootacamund,
16 December 1865.

(signed) *W. G. McIvor*,
Superintendent, Government Chinchona Plantations.

— No. 66. —

The Government of Madras to the Secretary of State for India.

Madras, 13 November 1865.

1. WE have the honour to forward the accompanying very satisfactory Report from Mr. McIvor on the Government Chinchona Plantations and Botanical Gardens on the Neilgherries, for the official year 1864-65, together with our proceedings of 27th September 1865, No. 2325, containing the observations and orders we have recorded on a review of that paper.

2. With reference to the subject of paragraph 31 of the Report we have to observe that we fully appreciate the importance of obtaining Mr. Markham's opinion and advice as to the best method of harvesting and preparing the Chinchona bark, but we have lately learnt that Mr. Markham has arrived in India, and doubt not that he will visit the plantations on our hills.

3. Two other letters from Mr. McIvor relating to the Report, dated 25th September and 3rd October, will be found appended thereto.

— No. 67. —

REPORT on the Government Chinchona Plantations and Botanical Gardens on the Neilgherries, for 1864-65.

Introductory observations.

Increase of propagation.

Number of plants on 31 May 1865, 558,105.

Height and growth of plants.
Thickness of stems.

Condition of plants at Neddivuttum and Pykara.

Dodabetta plantations.

Chinchona officinalis and varieties grow as well upon grass as on forest land.

Analysis of bark show great increase in alkaloids.

Bark submitted in 1862 yielded quinine in too small a quantity to be determined; that submitted in 1863 gave 3.30 to 3.40 of purified alkaloids; while that submitted in 1864 gave 6 per cent.

Dr. De Vry found 8.49 per cent. in one specimen of red bark.

1. IN submitting this Report it affords me much satisfaction to be able to state that the past season has been favourable for planting operations, and that considerable progress has been made in the works connected with our plantations. The plants continue to flourish and maintain a luxuriant state of health. The maximum monthly increase by propagation has reached as high as 31,984 plants, the average monthly propagation throughout the year being 21,200 against 15,326 the result of last year. The total number of plants on the 1st May 1865 was 5,58,105; this does not include 78,612 plants, the number issued to the public from the commencement to 31st May 1865. Our oldest plants were planted out in August 1862, and have attained heights varying from eight to 12 feet; the circumference of the stems, at six inches from the ground, varying from seven to 13 inches, the plants being well furnished with lateral branches, and present a most robust and healthy appearance. The Chinchona succirubra, Peruviana, and micrantha, continue to thrive on the Neddivuttum and Pykara plantations, at elevations varying from 4,000 to 6,000 feet, while Chinchona officinalis, Bonplandiana, and crespilla, continue to grow more sturdy and vigorous on the Dodabetta plantations, at elevations varying from 7,000 to 8,350 feet. These latter species grow equally well upon grass as upon forest land, and bear almost every exposure, hence they may be successfully cultivated over the whole plateau of the Neilgherries, excepting such land-locked hollows as are subject to severe frosts. The results of last year's analysis of the barks has exhibited a farther increase in the yield of alkaloids, which is both interesting and encouraging. The first sample of bark submitted in 1862 yielded quinine, but the quantity was not determined. The bark forwarded in 1863 yielded 4.3 per cent. of rough, and 3.30 to 3.40 of purified alkaloids, while that forwarded in May 1864 gave 6 per cent. of purified alkaloids. These are the results of the analysis by Mr. Howard; while the analysis by Dr. De Vry gives still more favourable results, that gentleman having found in specimen No. 7 as much as 8.49 per cent. of alkaloids, being fully five times the average quantity found in the barks of commerce. This result has exceeded our most sanguine expectation, and together with the observations of

Mr.

Fig. I.

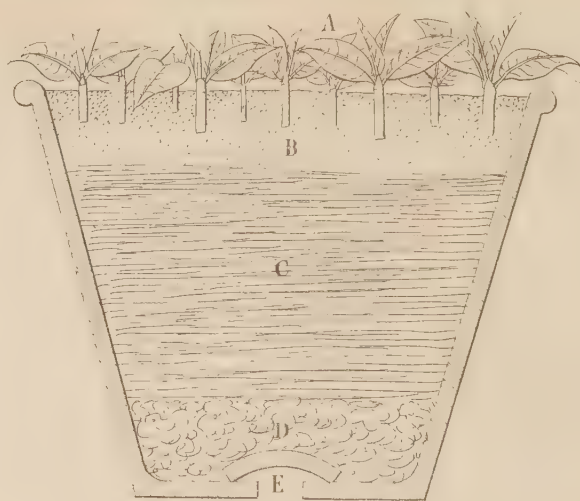
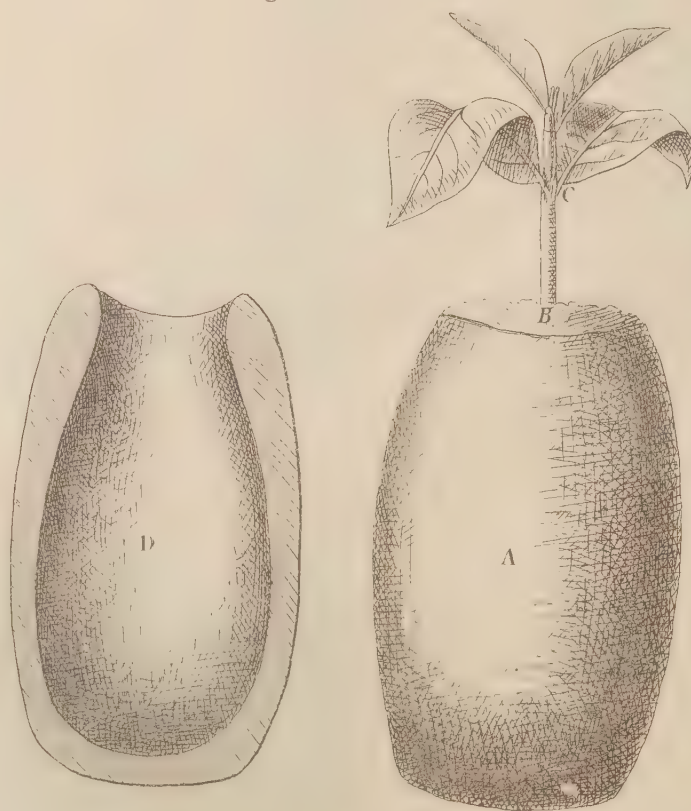


Fig. II.



Mr. Howard establishes that cultivation does greatly favour the increase of alkaloids, and also improves their quality, at least in the chinchona succirubra, and we may assume that a like result will be produced in the other species of chinchona. With these observations, I proceed to particulars which, for the sake of convenience, are arranged under the following heads:—

Cultivation seems to increase the quantity and improve the quality of alkaloids.

	Paras.
1. Propagation of the plants, alteration in system of	- 2 to 4
2. Condition and growth of the plants - - -	- 5 to 10
3. Cultivation, modification in system of - - -	- 11
4. " under the shade of living trees - - -	- 12 & 13
5. " results obtained by private planters - - -	- 14 & 15
6. " felling forests for, effect on springs and water supply - - -	- 16 to 18
7. " elevation and exposure best suited to the different species - - -	- 19 to 25
8. " soils best suited to the different species - - -	- 26
9. " effect of storms and wet weather on - - -	- 27 & 28
10. Gathering the bark, further observations on treatment for this purpose - - -	- 29 to 35
11. Alkaloids, effect of cultivation on the produce and quality of - - -	- 36 & 37
12. Insects injurious to the plants - - -	- 38 & 39
13. Chinchona, new varieties introduced of, remarks on - - -	- 40 & 41
14. Establishments - - -	- 42 & 43
15. Progress of operations - - -	- 44 to 50
16. Botanical gardens - - -	- 51 to 54
17. Tea plantations* - - -	- 55
18. Lawrence Asylum planting operations - - -	- 56
19. Concluding remarks - - -	- 57 to 60

Appendix A.—Accounts from the commencement of operations to the 30th April 1865.

Do. B.—Meteorological observations at Neddivuttum.
Do. C.— Ditto - Ditto at Ootacamund.

2. Owing to the large number of plants produced, and consequently the employment of much labour in this operation, we have found it necessary, in order to economize and lessen the cost of propagation, to abandon the system of placing the cuttings on a piece of brick, as described in previous reports. The method now adopted is to fill the pots as formerly with prepared soil, but only to within an inch or three-fourths of an inch of the surface; this space is then filled up with pounded brick dust, into which the cuttings are inserted as at A in Figure I.*; B, representing the stratum of brick dust; C, the ordinary soil used and described in previous reports; D, moss to facilitate drainage; E, the potsherd or draining material. Under this treatment the cuttings are found to root more freely than by the method previously adopted, while a man can pot off in a day from four to five times the number of cuttings. This simple expedient, which may scarcely appear worth detailing, is of great importance in extensive propagating operations, as it reduces the cost to nearly one-fifth of that originally incurred, and at the same time economizing space in the propagating cases, as by the present system double the number of cuttings can be placed in a four-inch pot.

Propagation of the plants, alteration in system of.

Cuttings now planted in brick dust.

* See Drawing opposite.

When thus treated, root more freely.

This system much reduces the cost of propagation.

3. The cuttings when rooted in the propagating cases are not, as hitherto, transplanted into larger pots, but the cutting pots removed into the hardening cases, and when hardened off, the plants are placed singly into pots two inches in diameter, and about $3\frac{1}{2}$ in depth, formed of a mixture of cowdung and sand, as illustrated at Figure II.*; A being the cowdung pot; B, the soil; C, the plant; D, a section. These pots are, prior to use, dried in the sun, by which they become hard and in every respect answer the purpose of an ordinary pot; when buried in the soil they become soft by the moisture, and in this condition are easily penetrated by the roots of the plants, but are still sufficiently adhesive to permit of handling, without breaking, when removing or transplanting the plants.

Rooted cuttings not transplanted from cutting pots until hardened, when they are put singly into pots formed of cowdung and sand.

* See Drawing opposite.

The cowdung pots cheaper and better than the ordinary earthen pots, and admit, in permanently planting out, of being placed together with the plant into the ground.

4. These cowdung pots are made by hand, and a man will make from 400 to 500 per diem; they are thus produced at less than $\frac{1}{100}$ th part of the cost of an ordinary pot, while they more effectually answer the purpose required in giving nourishment to the young plants, and, in the operation of permanently planting out, admit of the pot with the plant being at once placed into the soil, thus avoiding the injury done to the roots in removing the plant from ordinary earthen pots.

Condition and growth of plants.

Growth of the plants planted by the Governor and Staff in August 1862.

5. The first chinchona plants were permanently planted out on the 30th August 1862. The 11 plants of *C. succirubra* planted by his Excellency Sir William Denison and staff, made an average growth of 3 feet from that time to 30th April 1863, the circumference of the stems, at 6 inches from the ground, varying from 2 to 3½ inches; and from the 1st of May 1863 to 30th April 1864 these plants made an average perpendicular growth of 2 feet 11 inches, with the circumference of the stems varying from 6 to 9 inches; and from the 1st May 1864 to 30th April 1865 these plants attained an average perpendicular growth of 1 foot 6 inches, with stems varying from 8 to 12 inches in circumference. The perpendicular growth of these individual plants in the official year 1863-4 exceeded the average growth of the same species throughout the plantation by about 3 inches. This year, however, these plants have not attained the average growth of those on the plantation, in consequence of the heavy storms which have prevailed, and the situation in which they are planted, being exposed to the full force of the western winds. On the first Denison Plantation the *C. succirubra* was planted at 10 and 12 feet apart, and the branches of many of these plants are now touching each other, presenting the appearance of a luxuriant young forest. The bark has much increased in thickness, while the markings characteristic of the finest Peruvian bark become more and more apparent; mosses and lichens having developed themselves upon the stems of the oldest plants. This, in combination with the healthy growth of the trees, now establishes, beyond all doubt, that the chinchona bark can be grown on the Neilgherries to as great perfection as in the most favourable localities on the Andes. The *C. succirubra* still continues to grow most robust, and to produce the thickest and the largest quantity of bark in a given period; this species is also very hardy, and would, no doubt, be most profitable to cultivate at elevations varying from 4,000 to 6,000 feet. One plant of this species has already produced perfect seeds, and as upwards of 1,000 plants are now in bloom, we may shortly expect to be able to supply abundance of seed of this valuable species, which stands pre-eminent in the quantity of alkaloids it produces, also in the thickness of its bark, and in its luxuriant and rapid growth; in short, it possesses in the highest degree every quality necessary in a plant intended for profitable cultivation.

Bark much improved in thickness.

Can be grown to great perfection on the Neilgherries.

C. succirubra the most profitable species to cultivate.

C. officinalis and its varieties next in value.

And better suited for growth at high elevations and exposed situations.

C. Calisaya rich in quinine, but of slow growth.

Seems to grow best at high elevations.

6. The *C. officinalis* (*Condamenia*) in cultivation promises to rank second in value, producing a bark nearly equal in thickness to *C. succirubra*, but the plant is of less luxuriant habit, although more hardy and better suited for cultivation in exposed situations and high elevations. This species, together with its varieties, *crepilla* and *Bonplandiana*, should invariably be selected for cultivation at high altitudes, as they thrive best at elevations varying from 6,000 to 8,000 feet; some plants of the *C. officinalis* are coming into bloom, and possibly may produce perfect seeds this season.

7. The *C. Calisaya* has hitherto only been planted at elevations varying from 4,000 to 6,000 feet, and here the plants thrive well, although the habit of this species is less vigorous than the "Red" or "Crown" barks, the stems scarcely increasing more than half as much as these species in thickness during the same period of growth, and consequently, as a bark-producing tree, is less valuable. A few plants of the *Calisaya*, accidentally placed out at a high elevation (7,300 feet), seem to have adopted a much more luxuriant habit than those planted at lower elevations, consequently a number of this species will be planted

Fig. III.

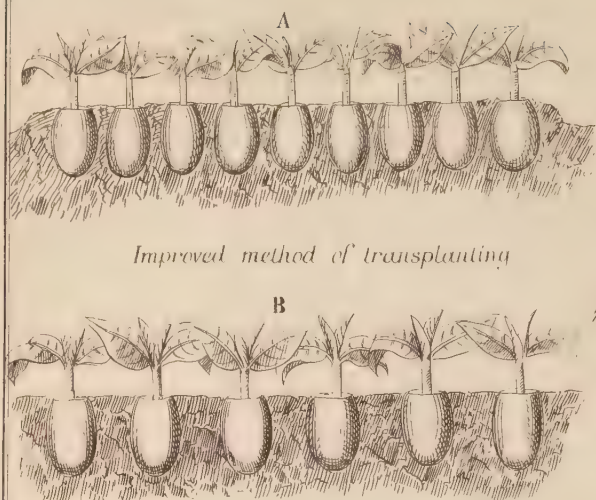


Fig. V.

Method of permanently planting out.

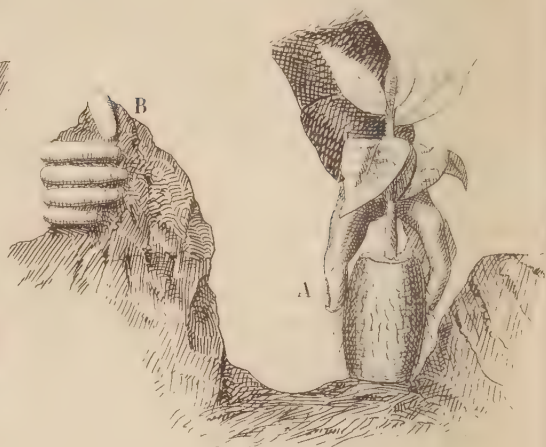


Fig. IV.

Method of transporting the plants.

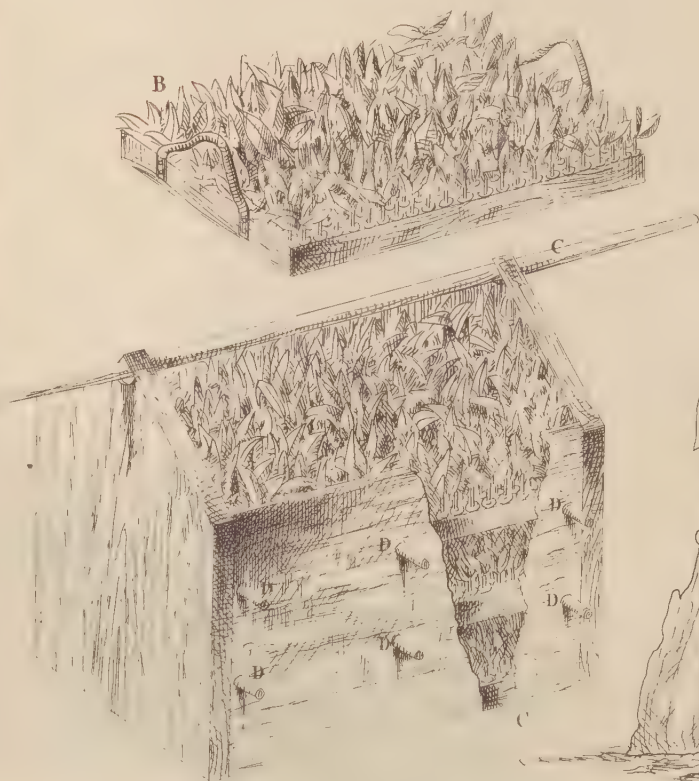


Fig. VI.

Rough wood protection & shelter for young plants.



planted during this season at much higher elevations than hitherto. Several plants of the *C. Calisaya*, planted on the 1st Denison Plantation in November 1862, are now in full bloom, presenting a most beautiful appearance, while their fragrance fills the air for a considerable distance.

Now in full flower on 1st Denison Plantation.

8. The *C. lancifolia*, received from Java, much resembles the *C. Calisaya* in its habit and growth, but our experience with this species has been too short to admit of an opinion being formed of its ultimate value as a cultivated plant. The plant, no doubt, is the true *C. lancifolia* of botanists, and is a most valuable species for the production of quinine.

C. lancifolia resembles *Calisaya*.

9. The propagation of the "Grey" barks, *C. micrantha*, *C. Peruviana*, and *C. nitida*, has been discontinued in consequence of the small quantity of quinine produced by these species; although they yield a considerable quantity of chinchonine; yet the value of this being much inferior to quinine, it has been considered undesirable further to extend their cultivation. Many of the older plants of these three species are now coming into bloom.

Propagation of grey barks discontinued.

Many of these species now in bloom.

10. The *C. Pahudiana* could be grown to any extent in this locality, but in consequence of the uncertain value of the plant it has not been propagated. A few of this species are also now in bloom.

C. Pahudiana.

11. The treatment described in previous reports has been found adapted to the requirements of the plants, but in order to lessen the labour and risks from carelessness in transplanting, some modification in our former treatment has been found necessary. The plants being established in the hardening cases, are planted in the nursery beds, as illustrated at Figure III.*: A being a transverse section of a row of cowdung pots as placed in the beds, and filled in between with earth; B, showing a longitudinal section of the bed, the pots being placed at the distance of $2\frac{1}{2}$ inches apart, and the spaces between them filled up with earth to a level with the stem of the plants. In this way the plants can be removed and transplanted by untrained labourers without danger of damage to their roots. In removing the plants from the nurseries to be permanently planted out, they are raised from the nursery beds and arranged on a light dealwood tray, 2 feet by 3 feet, as at Figure IV.* B; this tray being filled, is lifted by the handles and placed in the bottom of a box, as at C; another tray is filled in like manner, and three round sticks being run through holes in the sides of the box at D, the second tray is placed on and supported by these sticks, and the third tray treated in the same way. The box now being filled, and containing about 540 plants, is lifted by the pole G, and carried by two men to the planters, where it is deposited, the same men returning with an empty box to be refilled. The planters first draw out the pole and remove the upper tray from the box, and proceed to plant out the plants, as illustrated at Figure V.* A, filling in the soil in the manner shown at B; this completed, the plants are immediately shaded with split pieces of wood, as at Figure VI.,* and the operation of planting is finished. When the plants have grown above the wood, they are protected from chafing by a grass rope being twisted round the top, as at H. This rough split wood, as a protection and shade for the young plants, has been found quite as efficient as the baskets described in paragraph 27 of last year's report, and requires less labour, as one man in this manner is able to shade from 50 to 60 plants per day. The distance at which the plants are now placed, when permanently planted out, are for the "Red," "Grey" and "Yellow" barks 7×7 feet. The "Crown" barks in very exposed situations 4×4 feet, in medium exposed places 6×6 feet, and in sheltered localities they are also placed 7×7 .

Cultivation, modification in system of.

* See Drawing opposite.

* See Drawing opposite.

* See Drawing opposite.

* See Drawing opposite.

More economical, and as effectual as baskets.

Distance at which the plants are planted.

12. On our principal plantations the land was entirely cleared of forest prior to planting, but on the 1st Dodabetta Plantation, also on some portions of the 2nd, the forests were only partially cleared, in order to test the effect of cultivating the plants under the shade of

Cultivation under the shade of living trees.

Principal plantation entirely cleared of forest.

living trees, and the experience of upwards of two and a-half years, although comparatively short, is still, I think, sufficient to establish beyond doubt that they cannot be successfully grown under living shade. The plants in such situations are weak, "drawn," and liable to damp off in continuous wet weather, and they suffer much more from gales of wind than in open and even exposed places, while the accidental falling of the forest trees, which occasionally takes place, destroys many of the young plants.

13. Altogether about 40 acres of chinchona have been planted under living shade, and I would respectfully suggest that while the chinchona plants are young, the forest trees be removed from about 30 acres, preserving 10 acres by way of experiment, as it will probably be 30 or 40 years before any return can be expected from plants grown under the shade of forest.

14. Notwithstanding the scarcity of labour on these hills, and the great difficulty and expense of getting work performed, chinchona cultivation continues to be eagerly entered into by private planters, some being on a very large scale, which bids fair shortly to establish chinchona bark as a staple product of the Neilgherries. Mr. Money, a gentleman from Bengal, having procured no less than 900 acres of land in the Deva Sholah and its neighbourhood to be devoted entirely to chinchona cultivation.

15. From Mahableshwar, Belgaum, Honore, and elsewhere in the Bombay Presidency, reports have been received of the plants making fair progress, while the plants supplied to Mr. Fitzgerald at Darjeeling are succeeding well; also in the north-western provinces considerable success has been attained. From Coorg, Nuggur, and Wynad, reports have been received which seem to establish that the plants grow freely, and promise to be cultivated with great success in these localities. The number of plants issued from our nurseries to the public in three years, exceeds 78,000, and portions of these have been distributed to every district in India considered suitable to their growth.

16. Further observations seem to establish the impression detailed in paragraphs 17 to 22 of last year's report, that the felling of forests at the sources of springs, and along the banks of streams, instead of diminishing (as generally believed), considerably increases the flow of water. The views on this subject, as the Government correctly observe, are not those in general acceptance, but the question is one of so great moment to India, where the water supply forms the wealth of the country, that the facts observed are worthy of careful investigation. The result of experience from the felling which has already taken place, unmistakably establishes that, in these localities at least, streams flow far more copiously, and maintain their volume much more regularly, throughout the dry season when the forests are felled, and this has continued for four years. These are facts hitherto unaccounted for, and apparently little observed, although they appear to take place in every spot where felling has been carried on to any extent. The felling of forests is not supposed in any way to increase or diminish the rainfall, but to preserve and economise it, giving off the water to the streams by the slow and regular process of filtration, the land being deprived, by felling, of the myriads of pumps in the shape of trees, which previously daily drew from the arteries and dissipated into the air an immense quantity of water.

17. The effect of forests in attracting clouds and moisture, or increasing rainfall, is a complex subject not easily subjected to practical test, but deductions drawn from the fact that young trees require for their existence more uniform moisture than old ones, it is fair to conclude that trees exercise no influence in attracting moisture, as all spots upon which forests are now found must necessarily have been more uniformly moist prior to the forests being produced than after they became established.

Dodabetta plantation, partly under living shade, plants do not grow well.

Are also injured by the falling of the forest trees during storms.

Suggests that the forest trees be removed.

Cultivation, results obtained in, by private planters.

Increase of private plantations.

Progress of plants in different districts of India.

78,000 plants issued to the public.

Felling forests for chinchona cultivation, effect on springs and water supply.

Streams continue to flow more copiously when forests are felled.

Question of great importance.

Felling of forests not supposed to effect rainfall.

Because young trees require more uniform moisture than old ones.

Fig. VIII.

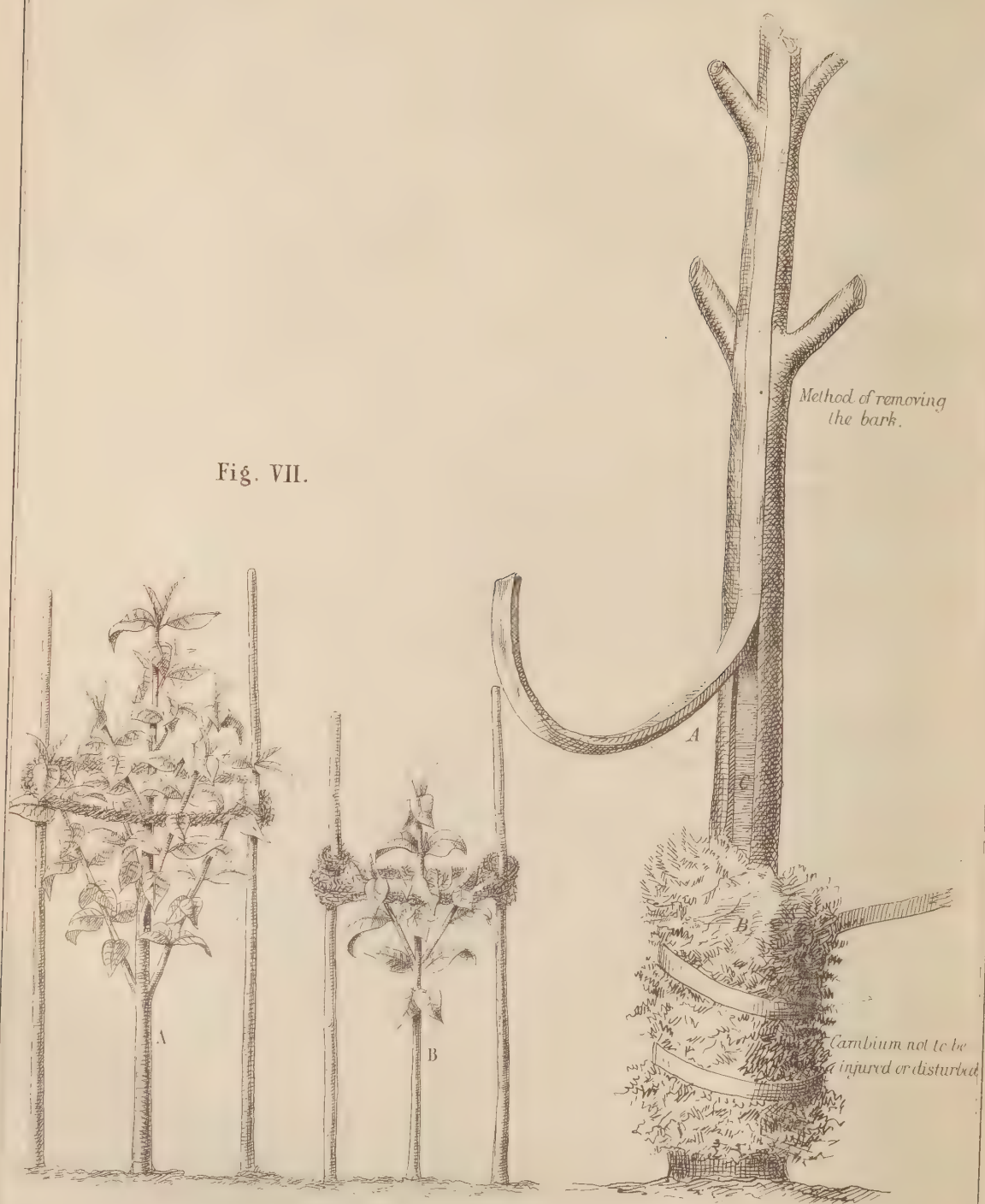


Fig. VII.

Method of removing the bark.

Cambium not to be injured or disturbed

18. In the extension of our operations it will be necessary to fell several other forests well calculated to test the effect of trees upon the flow of water in springs and streams, consequently instruments have been constructed to measure the flow of water in the streams issuing from these forests, for at least a year prior to the trees being felled. The flow of water from the same forests being registered by the same instruments for several years after felling, will establish the exact increase or decrease in the flow, and its variations throughout the seasons both in the unfelled and felled forests.

Instruments constructed to measure flow in streams and springs.

19. The elevations found best suited to the growth of *C. succirubra* or "Red" bark is about 6,000 feet; the plant, however, will grow at considerably greater elevations, as also down to 4,000 feet, but they have been found to thrive best at elevations varying from 5,000 to 6,200 on slopes facing the north, and well sheltered from the N.E. and S.W. monsoons. On the 1st Denison and Markham Plantations, which possess this aspect, nothing could be more satisfactory than the growth of these plants, while on the lower portion of the 2d Denison Plantation, which is very much exposed to the S.W. monsoon, and to the full effect of the rays of the afternoon sun, during the dry season, the growth of this species has been very unsatisfactory, the plants being stunted in consequence of the soil becoming parched and dried up during the months of February and March, while they are cut to pieces in the months of June and July by the violence of the winds. Various expedients have been adopted to counteract these disadvantages, and although none of them have proved quite effectual, they have been so far useful in protecting the plants as to merit description.

Cultivation, elevations and exposure best suited to.

Elevation and exposure best suited to the "Red bark."

Effects of exposure on.

20. The plants when young are shaded and protected as described in paragraph 11, and when they attain the height of one foot or 18 inches, they are staked, and tied with grass ropes as at Figure VII.* A and B, great care being taken to see that the grass rope does not touch the stem of the plant, as when this is the case, the movement of the plant with the winds cuts the bark through at the point of contact with the rope, and destroys the plant; this can be effectually avoided by drawing the rope up to encircle the leaves and small branches when present, so that the leaves or branches come between the rope and the stem of the plant. This requires particular attention; because, if not attended to, a whole plantation might be destroyed in one storm, it being much better that the plants be not tied at all, if not secured effectually.

Means of protection.

* See Drawing opposite.

21. The various species of "Crown" bark, *C. officinalis* (Condamenia), *Bonplandiana* (Uritusinga), and *crepilla*, thrive best at elevations varying from 6,000 to 8,350 feet, the latter being the highest elevation at which the plants are grown here. These species or varieties, when well secured, as described in the preceding paragraph, grow in any exposure, and even where exposed to the full force of the monsoons they are not much injured, although their leaves become shattered by the storms; fresh leaves, however, being immediately produced, the plants are not materially damaged. These species will not grow in land-locked hollows subject to severe frosts, but otherwise can be grown in almost every soil on the plateau of the Neilgherries, apparently succeeding as well in grass land as in forest. Although the "Crown" barks bear this amount of exposure, nevertheless, like all the other species of chinchona, they thrive best in well-sheltered situations, with a N. or N.E. aspect, as these localities maintain a more uniform moisture throughout the dry season, and this is highly beneficial to the growth of chinchona.

Elevations and aspects for the "Crown barks."

Bears considerable exposure.

But prefers sheltered positions.

22. The "Yellow" bark, or *Chinchona Calisaya* and its varieties, grow well at 5,000 to 6,000 feet, and also in the Wynaud at 3,000 feet;

"Yellow bark."

feet; these are the only elevations at which we have grown the plants. This species, although valuable for the production of quinine, does not promise to be a profitable plant under cultivation, in consequence of the thinness of its bark and slow growth; a few plants unintentionally placed out at a much higher elevation than formerly (7,300 feet), have assumed a more robust habit than those planted at a lower altitude.

“Pitayo bark.”

23. The “Pitayo” bark, *C. lancifolia*, has been planted out at an elevation of 7,600 feet, but owing to the few plants, and the shortness of our experience with this species, it is impossible at present to state with any certainty the elevation best suited to the cultivation of the plant.

“Grey bark.”

24. The “Grey” barks, *C. Peruviana*, *nitida*, and *micrantha*, have been found to grow well in the localities in which they were originally planted, at elevations varying from 4,500 up to 6,000 feet, flourishing best at the highest elevation, and in sheltered positions facing the north. During the present year these plants have not been propagated in consequence of the small quantity of quinine they produce; they are nevertheless rich in chinchonine.

C. Pahudiana.

25. The *C. Pahudiana* continues to flourish both at an elevation of 5,000 and 7,400 feet, but this has also not been increased in consequence of the uncertain value of its bark. Another species, nearly allied, if not identical with the *Pahudiana*, has recently been received from Java, but none of these have yet been permanently planted out.

Cultivation, soils best suited for.

Soils best suited to the growth of chinchona.

26. The *C. succirubra* or the “Red” barks thrive in a dark crown deep vegetable mould, resting upon an open subsoil. The *C. cespilla* in peaty land; the *C. officinalis* also grows freely in this soil, but prefers a deep brown mould; this species is also found to grow well in the laterite soils so common on the plateau of the Neilgherries. The “Yellow” and “Grey” barks prefer the same soil as the *C. succirubra*, while the *C. lancifolia* and *Pahudiana* indicate a preference for a dry and gravelly soil.

Cultivation, effects of storms and wet weather upon.

Plants, when established, are not liable to be blown down.

27. The different species of chinchona are found to establish themselves securely in the ground, in consequence of their throwing out a dense mass of fibrous root, much like the rhododendron; and thus the plants are secure against being blown down even in the heaviest storms. In exposed situations, however, the stems are occasionally broken off, while the foliage of the larger leaved species are much tattered, and have sometimes been blown away entirely; however, as the plants attain age, the leaves become smaller, and are less affected by the wind. The greatest injury the plants receive is from the branches striking against each other, and damaging the bark.

Effected by continuous wet weather.

28. The continuous rain during the last monsoon proved less injurious to our plants than the preceding one, the plants of younger growth having suffered most; only five plants of the “Grey” barks having died during the monsoon, while 25 were lost from the effects of the previous monsoon. The “Grey” barks suffer most from the effects of heavy and continuous rain, while the leaves of all the species assume a yellow tint, indicating the presence of a superabundance of moisture; but this has only proved fatal to a few plants of the “Grey” barks. All the species luxuriate and make most vigorous growth in the seasons alternated with showers and sunshine, and even continue to grow well for two months after the rain has ceased, thus establishing that they bear a considerable amount of drought without injury.

29. Further

29. Further experience in removing strips of bark indicate this to be the most profitable system. The causes of failure in our first experiments having arisen, first, from the stems not being instantly covered with moss; and secondly, from allowing lichens to be mixed with the moss used for this purpose. This season the treatment of the plants on this system has been most successful, in consequence of the stems being covered with moss the instant the strips of bark were removed, care being taken to select such moss as was entirely free from an admixture with lichens, it being found that the presence of these among the moss generated a fungus which penetrated into, and injured the wood of the plants, preventing the formation of new bark. It is, therefore, of the utmost importance to select the best green moss, a uniform bright green in its texture indicating that lichens are not present, as the whole of the tribe of lichens can easily be distinguished by the casual observer from moss, which is always of a green colour, soft and velvet-like in appearance, while the lichens are invariably of a grey, yellow, or brown colour, scaly and harsh in appearance and to the touch.

Gathering the bark, further observations on the treatment for this purpose.

Removing strips of bark most successful.

Description of moss to be used for covering.

Lichens to be carefully rejected.

30. Figure VIII.* illustrates the stem of a plant with a strip of bark removed as at A; B, showing the manner in which the moss is laid on and secured around the stem. In removing the strip of bark, two parallel cuts should be made down the stem, at the distance apart of the intended width of the strip of bark, as at C; this done, the bark is raised from the sides of the cut, and drawn off, beginning from the bottom, care being taken not to press or injure the sappy matter ("cambium") left upon the stem of the tree. This cambium or sappy matter immediately granulates on the removal of the bark, and being covered forms a new bark, which maintains the circulation undisturbed. This is rather a precarious operation, and one which must be performed by intelligent men; but the results obtained by this system of treatment will no doubt double the annual yield of bark, because the renewed bark of one season's growth is quite as thick as ordinary bark of two or even three years' growth. The application of moss has also the advantage of greatly increasing the weight and thickness of the bark, and from the observations which have been made, would indicate an increase in the alkaloids, that is, a pound of bark covered with moss produces more alkaloids than the same quantity of bark not so protected. This very important question will be, to a certain extent, established by the analysis of the barks submitted to Mr. Howard in May last; but whether there is an increase in the yield of alkaloids or not, the effect of mossing the stems is to give a great increase to the yield in bark, and consequently in the value of the produce, the result of analysis already received establishing beyond doubt that the application of moss in no way decreases the yield of alkaloids. Dr. de Vry* having obtained from Neilgherry bark, treated in this manner, the enormous product of 8.409 per cent. of alkaloids, and in a state of greater purity than usually found in chinchona bark. The idea of artificially applying moss to the bark of our chinchona plants originated from the fact that the best chinchona bark of commerce is invariably overgrown with moss. Hence, the supposition that moss preserved the alkaloids from the process of oxidation

* See Drawing facing p. 165.

Quality of renewed bark.

Application of moss to thicken chinchona bark.

Effects on alkaloids and weight of bark.

* "The Chinchona Bark of British India," by Dr. J. E. de Vry, page 5.

"* * * * * The leaves of *C. succirubra*, *C. micrantha*, and *C. Pahudiana* contain traces of alkaloids; but I could not find quinine amongst them. The results of experiments on No. 7, Red bark, thickened by moss, deserve the greatest attention, for although Mr. Howard had already ascertained that Mr. McIvor's experiment of thickening the bark by covering it with moss had been really successful, I was quite struck by the enormous amount of 8.4 per cent. of alkaloids in so young a bark. The other peculiarity of this bark was that I never obtained chinchona alkaloids so easily pure as from it; hence, I hope that the experiment will be repeated by Mr. McIvor on a large scale, not only with *C. succirubra*, but also with the other species, and particularly with *C. Calisaya*."

oxidation or deterioration, which they apparently undergo when the bark is long exposed to the full action of light.

Considerations prior to reaping our first harvest of bark.

31. The period being rapidly advancing when we must begin to harvest our bark, it becomes a matter of serious consideration to devise the best means of preparing it, and, if possible, extracting the alkaloid on the spot, in order to save the cost of carriage. Connected with this subject I would much like the benefit of a personal consultation with Mr. Markham, especially as this gentleman has obtained much valuable information by experience in South America, and his intercourse with scientific men in Europe on the best methods of extracting the alkaloids. Moreover, an inspection of our plantations would enable Mr. Markham to draw a correct conclusion as to the state and health of the plants here, compared with those on the Andes.

Yield of alkaloids yearly increasing.

32. In South America the bark is gathered at random, and without reference to the period of its growth, or the best seasons for obtaining the alkaloids. The results of our observations are so limited that it is impossible to draw from them reliable practical deductions. I would, however, notice that our barks have increased in the produce of their alkaloid at the rate of about 2 per cent. per annum. As it cannot be supposed that the barks can continue to increase in this ratio, a period must occur at which the maximum quantity of alkaloids are contained in the bark, and after this there will in all probability be a period of deteriorations; should this be the case it is of vital importance for us to ascertain, and reap our harvest of bark at that period of growth when the bark contains the greatest amount of alkaloid. This refers principally to the removal of the bark from the stems of the trees, as the operation of lopping and barking the branches may have to be proceeded with for the sake of convenience, and to give light and air to the plants prior to the bark having attained its maximum quantity of alkaloid.

Must shortly attain the maximum when it should be gathered.

33. Mr. Howard's analysis of the bark submitted in May last will give much information on this subject, for if our last sample of bark gives an increase over that submitted in May 1864, it will be undesirable for us to harvest our bark until this yearly increase has ceased or at least become unimportant.

Plants when cut down for their bark, rapidly produce new shoots.

34. All the species have been found to throw out shoots from the stools when prepared, as described and illustrated at paragraph 21, Plate VI., in the manual on chinchona cultivation, dated March 1863. This will necessarily have to be practised when the plants are placed close together, and it becomes necessary to remove each alternate tree to give light and air to the plantation.

Recommends from 7,000 to 10,000 plants to be covered with moss.

35. The quotations at foot will, I trust, be sufficient to establish that no injury can accrue from the application of moss to the stems of our plants, and with the permission of Government I will at once moss from 7,000 to 10,000 of our largest plants, preparatory to removing the bark.

Effects of cultivation on the quality and produce of alkaloids.

36. The analysis by Mr. Howard* of the samples of bark collected in

* "Report of an Analysis of the Third Remittance of Bark from India.

"From J. E. Howard, Esq., to the Under Secretary of State for India, June 15, 1864.

"Sir,—I have the honour to report that I received, on the 20th May, the specimens mentioned by Mr. McIvor in his Despatch of 17th March last, and that the same were all in good condition. I have since devoted most careful attention to ascertain by experiment the probable market value especially of the first two samples of the bark sent. It will not be necessary for me to detail the various means by which I succeeded in convincing myself, not only of the existence of the alkaloids, but of their being extant in such a state of purity as is certainly not found in the ordinary samples of red

in February 1864, shows an increase in the quantity of purified alkaloid of 3·60 per cent. on the result obtained in 1863, while the result of Dr. de Vry's analysis* of bark from the same plantation, collected in

Results of analysis of bark thus treated.

bark imported from South America. The result of my examination tended to show distinctly that cultivation has improved the produce of at least this species of chinchona.

"I must remark that the commercial value of specimens of bark intended for the manufacture of sulphate of quinine can never be ascertained by the mere knowledge of the per-centage of alkaloid soluble in ether, since it is necessary that this should be shown to exist in such a state as to crystallize with acids into the required compounds.

"In the case of No. 1, the bark from the thickest part of the lower branches of *C. succirubra*, two years and five months old, this examination was most satisfactory, confirming that which I stated in my first report as to the facility with which the alkaloids were obtained in a state of purity, although the amount of red colouring matter in the bark is very great. The amount of purified alkaloids I estimate at 6 per cent., consisting of quinine 3·14, chinchonadine 2·06, chinchonine 0·80. This large product of alkaloids might probably be still further increased by surrounding the stem with moss, in the manner which Mr. McIvor has so happily suggested, since Dr. de Vry found 8·409 per cent. of alkaloids in a stem which had been so treated. It seems to me from the trial, that the East India Bark, the produce of *C. succirubra*, will rival in price the Bolivian Calisaya, which is by no means the case with the bark of the branches of the *C. succirubra*, as grown in South America. It is important to remark, that the very high price of between 8 s. and 9 s. which has quite recently been paid for red bark in this market, applies only to those prices of bark from the trunk of the tree which possess from their age a peculiarly bright red appearance: I have forwarded a small vial with commercial sulphate of quinine obtained from this No. 1, as also sulphate of chinchonadine separated from the above. I have only to remark further on this bark, that its appearance bespeaks its good quality, and that there can be no doubt the season chosen (24th of February) is most favourable to its being well secured."

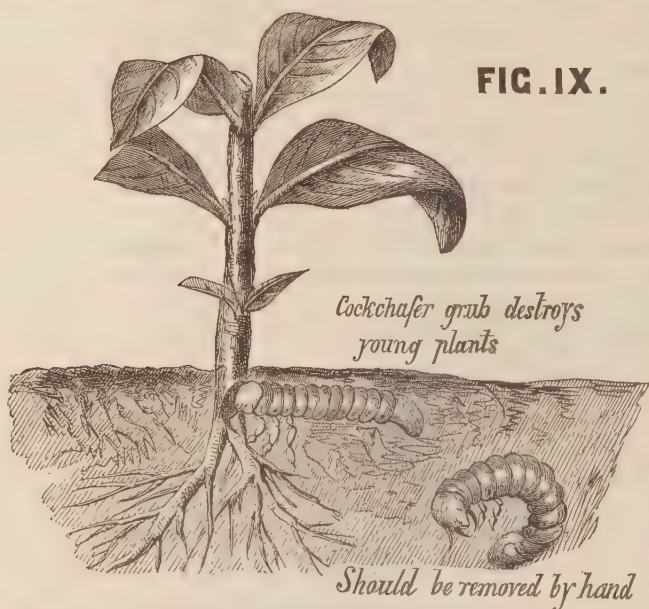
* "The Chinchona Bark of British India," by Dr. J. E. De Vry * * * page 4.

Specimens Examined.	Alkaloids in 100 Parts.	Quinine.	Chinchonine and Chinchonadine.	Chinchonine and Quinidine.	Quinovic Acid.	ANALYTICAL DATA.
3. <i>C. succirubra</i> :						
<i>a.</i> Bark of the stem	2·637	1·486	1·171	- -	0·398	41·7 grm. of bark of the stem produced 1·108 grm. of alkaloids, and 0·166 grm. quinovic acid; of the alkaloids 0·62 grm. were dissolved by ether.
<i>b.</i> Bark of the root	7·514	3·443	4·071	- -	0·533	21·2 grm. bark of the root produced 1·593 grm. alkaloids, and 0·113 grm. quinovic acid; of the alkaloids 0·73 grm. were dissolved by ether.
Stem-wood	-	-	- -	- -	0·212	25·0 grm. dry stem-wood produced 0·053 grm. quinovic acid.
<i>d.</i> Root-wood	-	-	- -	- -	0·867	18·8 grm. dry root-wood produced 0·163 grm. quinovic acid.
4. <i>C. succirubra</i> :						
Leaves - - -	0·017	-	- -	- -	1·300	32·4 grm. dry leaves produced 0·436 grm. quinovic acid; 76·7 grm. dry leaves produced only 0·013 grm. of very impure alkaloids, containing not a trace of quinine.
5. <i>C. succirubra</i> :						
Bracts - - -	-	-	- -	- -	0·870	15·3 grm. dry bracts produced 0·133 grm. quinovic acid.
6. <i>C. succirubra</i> :						
Juice dried in the sun	-	-	- -	- -	#	2·045 grm. dried juice was proved to contain not a trace of alkaloids, but quinovic acid was readily detected.
7. <i>C. succirubra</i> :						
Bark of the stem	8·409	2·765	5·644	- -	0·530	14·9 grm. dry bark produced 1·253 very slightly coloured alkaloids, and 0·08 grm. quinovic acid; of the alkaloids 0·412 grm. were dissolved by ether.
8. <i>C. Calisaya</i> :						
<i>a.</i> Bark of the stem	1·890	1·220	- -	0·670	0·640	14·5 grm. dry bark produced 0·274 grm. alkaloids, and 0·093 grm. quinovic acid; of the alkaloids 0·177 grm. were dissolved by ether.
<i>b.</i> Bark of the root	3·100	#	- -	y	#	3·25 grm. dry bark of the root produced 0·103 grm.; alkaloids partially soluble in ether.
9. <i>C. Calisaya</i> :						
Bark of the stem	1·520	0·724	- -	0·796	0·230	8·7 grm. dry bark produced 0·133 grm. alkaloids, and 0·02 grm. quinovic acid; of the alkaloids 0·063 grm. were dissolved by ether.
10. <i>C. Pahudiana</i> :						
<i>a.</i> Bark of the stem	0·450	x	y	- -	x	11·1 grm. bark produced 0·05 grm. alkaloids, for the greatest part soluble in ether.
<i>b.</i> Bark of the root	1·553	x	y	- -	0·450	11·2 grm. bark produced 0·174 grm. alkaloids, and 0·051 grm. quinovic acid; the alkaloids were partially soluble in ether.
11. <i>C. Pahudiana</i> :						
Leaves - - -	0·010	-	- -	- -	0·150	32 grm. leaves produced 0·048 grm. quinovic acid, and 0·004 grm. very impure alkaloids.
12. <i>C. micrantha</i> :						
<i>a.</i> Bark of the stem	2·791	-	- -	- -	0·113	28·3 grm. bark produced 0·79 grm. alkaloids, and 0·032 grm. quinovic acid; of the alkaloids 0·346 grm. were dissolved by ether.
<i>b.</i> Bark of the root	4·166	x	- -	- -	0·678	18 grm. bark produced 0·75 grm. alkaloids, and 0·122 grm. quinovic acid; of the alkaloids 0·15 grm. were dissolved by ether.
13. <i>C. micrantha</i> :						
Leaves - - -	traces	-	- -	- -	1·276	28·4 grm. leaves produced 0·36 grm. quinovic acid; 209 grm. leaves produced only 0·008 grm. very impure alkaloid.

in November 1863, gives a result nearly the same as that obtained by Mr. Howard, with one very important exception, namely, that of sample No. 7, which yielded an increase of 5.591 per cent., or a total of 8.409; this bark having been covered with moss for nearly twelve months prior to the bark being removed. A peculiar feature in the mossed bark noticed both by Mr. Howard and Dr. de Vry, was the existence of the alkaloid in abundance, and in a state of greater purity than in the ordinary samples from South America.

37. While cultivation has thus improved the quality of the alkaloid, in rendering it easily purified, it has increased the quantity at least five-fold, the alkaloid, as a rule, not being found to exceed 1 per cent., in so young barks from South America. These remarks refer principally to the "Red" and "Crown" barks, which have readily assumed the habit of domestic plants, being stimulated to vigorous growth by cultivation and the application of manure, while the barks are easily thickened by the artificial application of moss, without in any way retarding the growth or affecting the health of the plants.

38. Our young plants on being transplanted are apt to be destroyed by the grub of the cockchafer (*melanontha vulgaris*) gnawing away the bark at the crown of the root immediately under the soil, as illustrated at Figure IX.; these grubs can only be removed by hand picking. When once they have attacked a piece of land, their presence is soon detected by the plants assuming a yellow appearance; on this taking place, the roots of every plant should be examined and the grubs destroyed. In localities liable to suffer from attacks of these grubs, the perfect insect is easily destroyed in the end of March and the



beginning of April, as it flies abroad in the evenings immediately on the commencement of the first spring showers. Bright fires being lighted here and there on the land about half-past six in the evening, and a good flame maintained until about eight o'clock, myriads of these insects dash into the flame and are destroyed.

39. The leaves of the *C. succirubra* have, during the past year, been attacked by the caterpillar of a hawk moth, nearly allied to the oleander moth, but apparently a distinct species; this caterpillar, which is illustrated in Figure X.* at B, attacks and devours the leaves with great rapidity. In order to save the plants from their ravages, considerable labour has been entailed in removing and destroying these insects. The perfect insect is shown at A, and the chrysalis at C. Our cuttings in the propagating cases, as also the plants in the houses, are liable to injury from the attacks of the green and white fly; these are easily destroyed by tobacco fumigation. The other enemies which attack the chinchona, in common with all other plants, are the mealy and scaly bugs; these like the grubs of the cockchafer can only be removed by the hand, and when once they make their appearance should never be allowed to spread.

40. During the present year, three new species or varieties of chinchona have been introduced. To the Dutch Government of Java we are indebted for *C. lanceolata*; this plant, however, does not agree with Mr. Howard's figure and description of this species, but in general appearance

Shows quinine in greater abundance;

and purity than in ordinary samples of American bark.

Quality of red bark improved by cultivation.

Insects injurious to chinchonas.

And plants examined.

How to destroy perfect insect.

Leaves of plants injured by a caterpillar like that of the oleander moth.

See Drawing opposite.

Green and white fly attacks cuttings.

Mealy and scaly bugs.

New varieties of chinchona introduced, remarks on.

C. lanceolata.

Fig. X.



appearance and habit of growth, seems to be identical with the *C. Pahudiana*, and in consequence cannot be entered in our list until further information has been received on the subject, because of the inconvenience likely to arise from the distribution of species incorrectly named, and of uncertain value. Two varieties of the *C. Calisaya* have also been added to our stock, namely, *Calisaya var. frutex*, and *Calisaya var. vera*; the seeds of these varieties were imported by Mr. Markham, and are very valuable as quinine producing plants.

41. Arrangements have been made with Mr. Cross to re-collect seeds of the Pitayo barks, which failed last year afresh; a supply of these seeds may therefore be shortly expected, and it is to be hoped they will arrive in good condition and germinate freely, as the addition of this species and its varieties completes our collection of quinine yielding chinchonas.

42. Mr. Batcock, the Deputy Superintendent, has given every satisfaction in carrying out the work entrusted to his charge; also in superintending the payment of establishments, &c., and to whose attainments in drawing I am indebted for the illustrations in this report. Lieutenant Nichol, Assistant Superintendent, Neddivuttum plantations, has shown considerable energy and activity, and is attaining a better knowledge of the arrangement of labour, and conducting operations. Mr. Charles Dawson, Assistant Superintendent, Wood plantation, Pykara, has given every satisfaction, and is well worthy of imitation in the neat and tidy condition in which he keeps the plantations, and in the conciliatory spirit exhibited in the management of his labourers. I have also every reason to be satisfied with the manner in which Mr. Smith, the Assistant Superintendent of the Dodabetta plantations, has carried out the operations entrusted to his charge. Overseers Burrows, Hudson, and Demsey have been attentive and careful in conducting their respective works. In the office establishment, Narrainsawmy Naidoo and Mr. McNair continue to give every satisfaction in the performance of their duties as pay clerk and accountant.

43. The difficulties previously experienced in procuring and maintaining a sufficient number of trained labourers still continues to be severely felt, and as this difficulty seems yearly to increase, I fear a rise in our present rates of pay will be necessary. For the past year, and on the Neddivuttum plantations from the commencement, our labourers have had a slight indulgence in addition to their pay, by being supplied with grain at rates rather under those prevailing in the market, this advantage being given to the labourers by all coffee planters.

44. In addition to the range of hardening cases built in 1863 for the accommodation of 75,000 plants, our rapidly increasing stock has rendered it necessary to construct a temporary hardening house 100 feet in length by 18 wide, giving accommodation for 130,000 plants. This house has been found very useful in protecting our plants during the dry winter months. Our propagating appliances now afford accommodation for 135,000 cuttings, and hardening space for 250,000 plants. The total number of plants produced to 30th April 1865 was 645,717; of this number, 78,612 have been issued to the public; the number of plants propagated during the official year being 254,471, of which 47,489 have been sold or supplied to the public. On the 31st July 1865, the number and distribution of our plants stood as follows:—

Number of plants permanently planted out in the plantations	205,678
Ditto of plants in the open air nurseries	217,000
Ditto of rooted plants in the propagating and hardening houses	284,919
Estimated number of cuttings in the propagating cases	100,000

Total Number of rooted plants and cuttings - - - 807,597

Open air nurseries.

45. Extensive open air nurseries have been formed on the different plantations for the reception of the plants propagated this season. The old nurseries contained on the 1st May 1865, 134,000 well established plants; a portion of these have since been permanently planted out, and the nurseries re-stocked with young plants from the hardening houses. The nursery on the Dodabetta plantations has been enlarged to receive 150,000 plants. On the Neddivuttum plantations, 250,000; on the Wood plantation at Pykara, 150,000; and on the Mélkondah plantation, 30,000. This arrangement has been made in order to secure a large stock of well-established plants, they being found to transplant much better than plants direct from the hardening houses. The open air nursery at Ootacamund, enclosed by a brick wall, has also been extended, and now affords space for the reception of about 350,000 plants. This nursery is at present used for rearing eucalypti and other trees for planting the ridges on our plantations, and the Lawrence Asylum sites. In extending these nurseries the beds have been formed in the manner described in the "Manual on Chinchona Cultivation," and the plants recently planted as described at paragraph 11 of this report.

Nursery at Ootacamund at present used for rearing eucalypti, and other trees.

On the Neddivuttum plantations 60 additional acres planted, making 284 acres under cultivation.

46. On the Neddivuttum plantations 64 additional acres have been planted, making the total at that place of 284 acres under cultivation. This extension has been on the Markham and 2nd Denison plantations. Here 20 acres of additional forest have also been felled during the season, and about 50 acres pitted. The roads, drains, and water-courses through the Markham and Kilgraston plantations have been finished, together with the trenches inclosing these plantations, and a considerable portion inclosed by a high fence to exclude wild animals. On the 1st Denison plantation no planting operations have taken place, further than filling up a few spaces near the roads; here, however, additional surface drains have been formed, and pathways cut intersecting the plantation, and rendering every part of it easily accessible from the main roads. In this plantation nothing can be more satisfactory than the growth and condition of the plants.

Second Denison plantation much exposed to west winds.

47. On the 2nd Denison plantation the plants have not made such satisfactory growth, in consequence of being exposed to the full force of the winds. On the Markham and Kilgraston plantations the plants have made very satisfactory growth, these plantations promising in every respect to be fully as well suited to the growth of chinchonas as any site yet selected. On the Markham plantation a large gaol is in course of erection for the reception of 270 prisoners, to assist in working the plantations. This building is constructed with the intention of being ultimately formed into a bark store, and drying house, consequently the main walls have been raised high, so as to admit of a flooring being introduced. The upper main rooms to be used for storing the bark, the lower floor being furnished with flues will form the drying rooms. The walls, roof, and outside plastering of this building have been finished. The plastering of the interior, the sleeping benches, air drains, and out-offices have still to be completed. The two main rooms are intended to accommodate 225 native prisoners, and the eight verandah rooms 50 Chinese convicts, the other rooms being intended for the use of the police. On this plantation lines for koorumbers and the native artizans employed on the buildings have been constructed.

Gaol in course of construction.

To be ultimately used as a bark store.

On the Wood plantation 63 acres planted, making 71 under cultivation.

48. On the Wood plantation at Pykara 63 acres of land have been planted during the season, which, together with the 8 acres planted in 1863-64, gives a total at that place of 71 acres under cultivation; a further extent of 40 acres has been cleared, and is now in course of preparation for planting. In addition to this the avenue leading past the waterfalls has been re-planted, the roads widened, and edged with grass or box, a few arbours erected, and the main water channel from the Pykara river for the supply of the plantation reveted and well secured.

49. On

49. On the Dodabetta plantations the work has also progressed satisfactorily, 57 acres having been planted out during the season, making the extent under cultivation on these two plantations 152 acres. On the Second plantation several new roads have been formed, others widened and edged with grass or box, all the planted land drained, and about 70 additional acres pitted, or in course of preparation for planting. On this plantation a gaol has been erected for the accommodation of 100 prisoners, the main room to contain 70 native prisoners, and eight of the verandah rooms to accommodate 30 Chinese prisoners, the other rooms being for the police. This building is completed and ready for occupation; some of the out-offices, including the latrines, have not yet been finished, but will probably be so in the course of a month. This gaol is also constructed so as ultimately to be converted into a bark store.

Dodabetta plantations, 57 acres planted, making 152 under cultivation.

Gaol for prisoners finished; out-houses yet to be completed.

50. In forming the new plantation on the Koondahs, great difficulty still continues to be experienced in pushing forward operations, in consequence of the want of roads. Here, however, an extent of 193 acres has been felled, of this 150 acres have been lopped and burned, 75 acres pitted. The roads on the plantation are in a forward state, and when this portion is drained will be ready for the reception of the plants. The Superintendent's house has been built, a line of road traced and used as a bridle-path connecting the plantation with Ootacamund, a distance of 29 miles. The opening out of this line of road for cart traffic will probably cost between 30,000 and 40,000 rupees, but it would render available this hitherto untouched, although the finest tract of land on the Neilgherries, for tea and chinchona cultivation. I would respectfully suggest that the opening of this road be undertaken by the Department of Public Works, as it will be of immense advantage not only for the Government plantation, but for private planters who wish to open in this direction. The Bowany river being unbridged, prevents communication between the Koondahs and the Neilgherries during the monsoon. On the Mail-koondah plantation a gaol is also in course of construction. This building is intended to accommodate 95 native prisoners and 30 Chinese convicts. Only 5,000 plants have been placed in the nurseries on this plantation.

Mail-koondah plantation.

Operations.

Gaol in course of construction.

51. In the botanical gardens considerable improvements have lately been effected; between the upper and lower gardens an Italian parterre has been introduced with three basins for fountains; the eastern half of this parterre being finished, is planted with choice flowers and has become very attractive. A new orchid and fern house is in course of construction, which will prove of great advantage in enabling us to cultivate these very interesting tribes of plants. The house being furnished with a cascade and fountain, and placed in a well-protected position in the garden, offers every advantage for growing these plants; small parterres and terraces filled with flowering plants have also been added in the upper portion of the garden.

Botanical gardens, improvements in.

New orchid and fern house.

52. Arrangements have been made for labelling the plants in the gardens with their botanical names, classes, and orders, &c., the labelling being carried out simultaneously with the preparation of a catalogue of the plants. This list of plants is contemplated to be something more than a mere catalogue, as we possess many plants of interest, and especially the economic plants may be accompanied by a short notice of their habit of growth, soil, cultivation, &c.

Labelling plants.

And preparation of catalogue.

53. This season has added many valuable plants to our collection; and to his Excellency Sir William Denison we are indebted for supplies of fine seeds of the valuable timber trees of Australia; among these may be particularly mentioned, as introduced in large quantities, the various species of eucalyptii, as also the very valuable Arancarias Cookii, and Bidwillii, and the much prized Myall or violet scented acacia; likewise phormium tenax or New Zealand flax, the New Holland nymphaas, and several species of tropadlum. To General

Plants introduced.

McCleverty we are indebted for spores of several pretty New Zealand ferns which have germinated freely, especially the sweet-scented doodia; this gentleman has also supplied seeds of *Edwardsia microphylla*, a handsome Australian shrub. To Dr. Cleghorn we are indebted for seeds of various Himalayan trees; among these was a species of cherry apparently nearly allied to the British species, and as this plant succeeds admirably, will prove invaluable as a stock on which to graft the hybrid varieties. Dr. Cleghorn also supplied seeds of the best variety of the Bengal "bael." From the Mauritius Botanic Garden a Wardian case has been received in exchange for ferns and chinchonas, containing two valuable species of guava, the Chinese litchi, the camphor tree, and many other useful plants. To Major Michael we are indebted for a small collection of seeds of New Zealand trees and shrubs, which have grown freely, and containing many new and valuable species. To Captain Beddome, Acting Conservator of Forests, we are indebted for spores of many new and rare ferns; also to Colonel Scott for good seeds of the arbutus imedo.

Distribution of garden plants and seeds.

54. The following Table exhibits the distribution of garden plants, seeds, &c., for 1864-65 :—

Months.	Fruit Trees and Shrubs.	Timber Trees.	Shrubs and Flowers.	Collections of Seeds.	Amount.
1864.					<i>Rs. a. p.</i>
May - - - -	53	252	399	10	360 2 -
June - - - -	4	260	266	27	280 7 -
July - - - -	-	100	48	37	241 8 -
August - - -	164	2	199	27	289 2 -
September - -	-	12	119	29	175 5 -
October - - -	6	22	174	15	151 14 -
November - - -	-	8	149	9	79 3 -
December - - -	16	-	64	3	50 14 -
	243	656	1,418	157	1,628 7 -
1865.					
January - - - -	-	-	56	13	41 10 -
February - - -	26	-	2	8	148 6 -
March - - - -	43	44	144	20	135 12 -
April - - - -	4	76	274	27	283 6 -
TOTAL Distribution - -	316	776	1,894	225	2,237 9 -

Tea plantation.

Tea plantation, 7 acres planted.

Additional land prepared to be planted with chinchona.

55. In the tea plantation sanctioned in G. O., dated 23rd December 1863, No. 2,362, seven acres have been planted with about 9,000 plants of the Chinese and Assam varieties of tea, this extent having been planted, and about 12,000 additional pits made prior to the receipt of the G. O., dated 29th January 1864, No. 162, limiting the tea plantation to five acres, consequently no further operations beyond weeding, &c., have been in progress on this plantation, and the unplanted pits will be filled up with chinchona plants. The tea plants have made fine

fine growth, and will no doubt continue to do so, as the situation is well protected from the S. W. monsoon, the soil deep and of good quality. The tea seeds received from Dr. Jameson in March last, have not grown well, having apparently suffered much on the journey; their germinating powers were in a great degree destroyed.

Tea seeds received from Dr. Jameson arrived in bad condition.

56. At the new Lawrence Asylum sites 10,300 eucalyptus trees have been planted in clumps and belts, so as to afford shelter to the buildings, the species used being principally the eucalyptus globulus (blue gum), and eucalyptus giganteus (stringy bark); about 6,000 other trees more of an ornamental nature, such as willows and cypress, have also been planted along the avenues and bordering the belts and clumps of eucalypti.

Lawrence Asylum sites.

Timber trees planted.

57. Our chinchona plants being now produced at about one-fourth the cost originally incurred, I would most respectfully submit, for the consideration of Government, that the time has arrived when a reduction must be made in the prices charged to the public. The plants could be disposed of when 5,000 and upwards are taken by one party at the rate of 1 anna each, and 2 annas each, for any number under 5,000. This difference is not more than will be necessary to compensate for the comparatively additional labour and expenses in sending out small numbers of plants, as also to give encouragement to cultivation on a large scale; the above rates will, I calculate, cover the actual cost of production, including a reasonable per-centage on the cost of our propagating houses.

Concluding remarks.

Suggests a reduction in the price of chinchona plants.

To encourage cultivation on a large scale.

58. The majority of European gentlemen at present engaged in cultivation on these hills, from want of experience, have been unsuccessful in propagation, as also in transplanting these delicate plants, although qualified to carry on the cultivation successfully when the plants are established or delivered to them in such a condition as to be easily transplanted; our recent improvements in the preparation of the young plants, will enable us to deliver them in such a condition as they cannot be well injured in transplanting. This, together with the price being reduced to its lowest rate, will, I submit, give a great stimulus to chinchona cultivation on the Neilgherries, which must ultimately be productive of benefit to the Government, while it will secure the main object for which the plants were introduced, namely, an abundant and regular supply of quinine.

59. From the above details it will be observed that, during the year, our operations have made satisfactory progress; still the scarcity of labour continues to be severely felt, rendering it impossible to perform the different operations in their proper seasons; this great drawback, which has continued from the commencement of this undertaking, will, I trust, be overcome so soon as we are supplied with the 500 convicts sanctioned by Government for the working of our plantations. The accommodation for these convicts will shortly be completed on all the plantations; the gaol on the Dodabetta plantations, as before noticed, is now finished.

60. In conclusion, I beg to tender my grateful acknowledgments to his Excellency Sir William Denison and the Government of Madras, for the very liberal manner in which they have met every suggestion tending to facilitate the progress of this undertaking; to Mr. Markham, of the India Office, my best thanks are due, for much valuable information; also to Mr. Howard and Dr. de Vry, for the very important information these gentlemen have furnished on the formation of alkaloids in our Neilgherry barks.

(A.)—SANCTIONED ESTIMATE COST of each CHINCHONA PLANTATION, from Commencement of Operations to 30th April 1865.

PARTICULARS.	1.	2.					3.				4.		
	Operations preparatory to Receipt of Plants.	Superintendent and Office Establishment.					Nursery Department.				Dodabetta Plantations.		
	1860-61.	1861-62.	1862-63.	1863-64.	1864-65.	1861-62.	1862-63.	1863-64.	1864-65.	1861-62.	1862-63.	1863-64.	
	<i>Rs.</i>	<i>Rs.</i>	<i>Rs.</i>	<i>Rs.</i>	<i>Rs.</i>	<i>Rs.</i>	<i>Rs.</i>	<i>Rs.</i>	<i>Rs.</i>	<i>Rs.</i>	<i>Rs.</i>	<i>Rs.</i>	
Grant for the preparation of sites - - -	2,000	-	-	-	-	-	-	-	-	-	-	-	
Establishments, including salaries, &c. - -	- -	4,200	5,350	5,880	8,180	3,324	4,305	4,609	3,948	2,280	5,400	5,700	
Buildings - - -	- -	-	-	-	-	{ 1,200 } { 2,000 }	-	-	800	560	-	-	
Tool and store rooms - - -	- -	-	-	-	-	-	-	-	-	-	250	-	
Coolies' quarters - - -	- -	-	-	-	-	-	-	-	-	200	500	-	
Felling - - -	- -	-	-	-	-	-	-	-	-	400	1,500	-	
Clearing - - -	- -	-	-	-	-	-	-	-	-	280	1,500	-	
Pitting - - -	- -	-	-	-	-	-	-	-	-	400	1,500	-	
Carriage of plants - - -	- -	-	-	-	-	-	-	-	-	150	-	-	
Planting and shading - - -	- -	-	-	-	-	-	-	-	-	200	500	-	
Trenching - - -	- -	-	-	-	-	-	-	-	-	1,800	-	-	
Inclosing - - -	- -	-	-	-	-	756	-	-	-	-	5,850	-	
Road making - - -	- -	-	-	-	-	-	-	-	-	-	2,025	-	
Tools - - -	- -	-	-	-	-	-	-	-	-	-	1,200	-	
Contingencies - - -	- -	-	-	-	-	196	-	-	300	399	1,200	-	
TOTAL - - - <i>Rs.</i>	2,000	4,200	5,350	5,880	8,180	7,476	4,305	4,609	5,048	6,669	21,425	5,700	

PARTICULARS.	5.				6.			7.		8.
	Neddivuttum Plantations.				Pykara Plantations.			Mailkoondah Plantations.		
	1861-62.	1862-63.	1863-64.	1864-65.	1862-63.	1863-64.	1864-65.	1863-64.	1864-65.	
	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Total.
Grant for the preparation of sites - -	- -	- -	- -	- -	- -	- -	- -	- -	- -	2
Establishments, including salaries, &c. -	5,064	8,412	15,348	12,360	- -	4,033	6,564	- -	5,600	1,17
Buildings - - -	2,080	- -	- -	750	{ 1,530 } { 2,000 }	- -	- -	- -	750	12
Tool and store rooms -	250	- -	- -	400	250	- -	350	125	150	2
Coolies' quarters - -	1,000	1,000	- -	300	1,000	- -	200	500	250	4
Felling - - -	1,500	3,000	- -	900	1,500	- -	900	6,150	900	17
Clearing - - -	1,500	3,000	- -	900	1,500	- -	900	- -	900	11
Pitting - - -	2,000	3,000	- -	900	- -	- -	900	- -	900	10
Carriage of plants -	450	450	- -	400	- -	- -	350	- -	50	2
Planting and shading -	550	550	- -	350	- -	1,300	250	- -	- -	3
Trenching - - -	4,000	- -	- -	1,100	- -	8,000	1,250	- -	1,250	17
Inclosing - - -	3,900	- -	- -	- -	- -	750	- -	375	300	12
Road making - -	1,520	- -	- -	550	- -	1,350	200	675	1,500	7
Tools - - -	1,282	- -	- -	900	- -	1,282	500	641	700	7
Contingencies - -	2,003	1,831	- -	600	- -	2,046	350	846	250	10
TOTAL - - - Rs.	27,099	21,243	15,348	20,410	7,780	18,761	12,714	9,312	13,500	2,39

Government Gardens, Ootacamund,
16 August 1865.

(signed) *W. G. McIvor*,
Superintendent, Government Chinchona Plantations.

(A.)—ACTUAL EXPENDITURE ON each CHINCHONA PLANTATION, from Commencement of Operations to 30 April 1865.

PARTICULARS.	1. Operations preparatory to Receipt of Plants.			2. Superintendent and Office Establishment.					3. Propagation and Nursery Department.					4. Dodabetta Plantations.			
	1860-61.			1861-62.	1862-63.	1863-64.	1864-65.	1861-62.	1862-63.	1863-64.	1864-65.	1861-62.	1863-64.	1863-64.	1864-65.		
	Rs.	a.	p.	Rs.	Rs.	Rs.	Rs.	Rs. a. p.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.		
ishment, in- ing salaries,	114	2	3	4,347	5,343	6,437	7,971	2,024 11 6	3,329	3,440	3,478	1,481	2,274	2,605	7,083		
ngs - - -	-	-	-	-	-	-	-	2,647 - -	3,578	3,000	1,500	865	-	-	7,250		
nd store rooms	-	-	-	-	-	-	-	-	-	-	-	-	-	230	-		
s' quarters -	-	-	-	-	-	-	-	-	-	-	-	-	250	500	-		
g - - -	302	5	3	-	-	-	-	-	-	-	-	448	750	500	650		
ng - - -	-	-	-	-	-	-	-	-	-	-	-	400	750	400	650		
g - - -	-	-	-	-	-	-	-	-	-	-	-	848	750	1,010	500		
ge of plants -	-	-	-	-	-	-	-	-	-	-	-	245	200	140	250		
ng and shading	-	-	-	-	-	-	-	-	-	-	-	355	450	560	700		
hing - - -	-	-	-	-	-	-	-	-	-	-	-	-	-	1,200	600		
ing - - -	-	-	-	-	-	-	-	-	-	-	-	-	2,800	-	357		
making - - -	300	-	-	-	-	-	-	-	-	-	-	600	700	2,070	1,000		
- - -	271	-	-	-	-	-	-	-	-	-	-	394	304	600	499		
agencies - -	67	-	-	-	-	-	50	-	-	-	450	124	460	500	800		
TAL - - Rs.	1,054	7	6	4,347	5,343	6,437	8,021	4,671 11 6	6,907	6,440	5,428	5,760	9,688	10 315	20,339		

PARTICULARS.	5. Neddivuttum Plantations.				6. Pykara Plantations.			7. Malakoondah Plantations		8. TOTAL.
	1861-62.	1862-63.	1863-64.	1864-65.	1862-63.	1863-64.	1864-65.	1863-64.	1864-65.	
	Rs.	a.	p.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	
ishment, in- ing salaries,	2,910	-	-	6,195	5,874	12,507	-	-	971	81,871 13 9
ngs - - -	1,560	-	-	-	1,000	8,550	1,683	-	350	32,483 - -
nd store rooms	-	-	-	350	500	450	275	-	300	2,355 - -
s' quarters -	-	-	-	1,750	1,000	500	1,100	550	250	6,150 - -
g - - -	1,780	7	3	1,500	2,200	800	1,550	2,000	750	16,431 12 6
ng - - -	-	-	-	1,500	2,200	500	1,125	2,000	750	11,900 - -
g - - -	1,680	7	3	858	2,000	700	-	-	1,000	10,684 7 3
ge of plants -	540	1	9	900	750	362	-	-	65	3,802 1 9
ng and shading	640	1	8	900	898	500	-	-	65	5,368 1 8
hing - - -	-	-	-	1,972	1,780	1,135	-	-	-	7,687 - -
ing - - -	-	-	-	1,550	900	-	-	-	679	6,586 - -
making - - -	1,100	-	-	1,000	2,000	327	-	-	504	12,474 - -
- - -	700	-	-	400	868	650	-	-	1,500	8,178 - -
agencies - -	340	-	-	915	850	1,200	-	-	400	6,631 - -
TAL - - Rs.	11,251	1	11	19,790	22,812	23,181	5,683	11,367	7,880	2,12,602 4 11

Government Gardens, Ootacamund,
16 August 1865.

(signed) *W. G. McIvor*,
Superintendent, Government Chinchona Plantations.

(B.)--METEOROLOGICAL OBSERVATIONS made on the Government Chinchona Plantations at *Neddivuttum*, from 1st May 1864 to 30th April 1865.

MONTHS.	Dry Bulb Thermo- meter.	Wet Bulb Thermo- meter.	Maximum Thermo- meter.	Minimum Thermo- meter.	Terrestrial Radiating Ther- mometer.	Rainfall.	Days with Rain.	Days without Rain.
	°	°	°	°	°	<i>Inches.</i>		
May - -	68	-	-	-	-	3.80	6	25
June - -	59	-	-	-	-	23.98½	13	17
July - -	58	57	63	54	59	65.29	8	23
August - -	58	57	66	54	58	9.96½	9	22
September -	59	57	68	55	58	11.18½	12	18
October - -	61	60	71	56	59	4.51	4	27
November -	60	55	70	54	59	1.30½	6	24
December -	60	55	75	53	59	.3	-	31
January - -	59	51	77	50	60	.31	-	31
February -	61	55	74	54	63	.29	1	27
March - -	66	57	80	56	66	.79½	3	28
April - -	66	59	82	58	65	5.80½	1	29

Government Gardens, Ootacamund,
16 August 1865.(signed) *W. G. McIvor*,
Superintendent, Government Chinchona Plantations.(C.)--METEOROLOGICAL OBSERVATIONS made at the Botanical Gardens, *Ootacamund*, from 1st May 1864 to 30th April 1865.

MONTHS.	Dry Bulb Thermo- meter.	Wet Bulb Thermo- meter.	Maximum in Shade.	Minimum in Shade.	Solar Radia- tion.	Terrestrial Radiation.	Rainfall.	Days with Rain.	Days without Rain.
	°	°	°	°	°	°	<i>Inches.</i>		
May - -	59	58	-	-	-	-	6.38½	18	13
June - -	59	58	-	-	-	-	5.23	21	9
July - -	55	54	-	-	-	-	8.66	26	5
August -	56	54	64	50	-	-	6.16	20	11
September -	56	54	65	46	-	-	3.92	12	18
October -	56	52	67	49	-	-	3.55	10	21
November -	56	52	68	47	-	-	2.64	13	17
December -	56	49	71	46	-	-	.86	6	25
January -	57	48	71	42	-	-	.47	3	28
February -	58	51	73	45	111	83	.9	2	26
March -	61	51	75	49	115	86	.13	2	29
April -	62	55	74	53	115	84	5.6	16	14

Government Gardens, Ootacamund,
16 August 1865.(signed) *W. G. McIvor*,
Superintendent, Government Chinchona Plantations.

— No. 68. —

Order of the Madras Government, 27 September 1865.

1. THE results of the year's operations detailed in the above Report may be briefly epitomised as follows.

2. The average monthly increase in the number of plants by propagation was 21,200, and the total number of plants on 1st May 1865 was 558,105, exclusive of 78,612 plants issued to the public.

3. The oldest plants, which were planted out in August 1862, are now from 8 to 12 feet in height, and from 7 to 13 inches in girth, at 16 inches from the ground, "well furnished with lateral branches, and present a most robust and healthy appearance."

4. The analysis of the barks has exhibited a further increase in the yield of alkaloids, Mr. Howard having obtained 6 per cent. of purified alkaloids, while Dr. De Vry found in one specimen as much as 8.49 per cent. of alkaloids, being fully five times the average quantity found in the barks of commerce.

5. In the oldest plantations the branches of the plants 10 and 12 feet apart are now touching each other; the bark has much increased in thickness. The characteristic markings of the finest Peruvian bark are becoming more and more apparent, lichens and mosses being freely developed. The plants are flowering freely, and perfect seeds have already been obtained; in short, there is no room to doubt that the chinchona can be grown on the Neilgherries to as great perfection as in the most favourable localities in which it has been found, and the "Crown" bark species is found to do well in almost every soil on the plateau of the hills, in grass land as well as in forest, so long as land-locked hollows are avoided, in which it suffers from frost.

6. Additional hardening houses and nurseries have been provided.

7. At Neddiwuttum 64 more acres have been planted, and a total area of 284 acres is there under cultivation. About 50 more acres have been pitted, and 20 acres of forest felled.

8. A building to be used temporarily as a gaol for 270 convict labourers, and ultimately as a bark store and drying-house, is under construction.

9. At Pykara 63 more acres have been planted, making a total of 71 acres under cultivation, and a further extent of 40 acres is under preparation.

10. At Doddabett 57 more acres have been planted, making a total of 152 acres cultivated, and 70 more acres are under preparation.

11. A building to be temporarily occupied by 100 convict labourers, and ultimately converted into a bark store, has been completed.

12. On the Koondahs 193 acres are in different stages of preparation. A superintendent's house has been built, and much road work done.

13. A building to be temporarily used as a gaol for convict labourers is under construction, and about 5,000 plants have been placed in the nurseries.

14. Thus altogether an additional area of 184 acres has been planted during the season, and a further area of 373 acres is under preparation.

15. The total extent planted is 507 acres, viz. :—

	Acres.									
Neddiwuttum	-	-	-	-	-	-	-	-	-	284
Pykara	-	-	-	-	-	-	-	-	-	71
Doddabett	-	-	-	-	-	-	-	-	-	152
										507

16. The total cost of the operations up to 30th April 1865 was 2,12,602 rupees, thus distributed,—

	Rs.
Establishment - - - - -	81,872
Buildings - - - - -	40,988
Plantations - - - - -	62,459
Roads - - - - -	12,474
Tools - - - - -	8,178
Sundry contingencies - - - - -	6,631
	2,12,602

17. The Government consider that the progress in the operations has been very satisfactory, and they congratulate Mr. McIvor on the important success that has attended his labours in this national undertaking.

18. He will act as he thinks best in regard to the removal of the forest trees referred to in paragraph 13.

19. The subject of paragraph 31 will be submitted for the consideration of the Secretary of State. The Government fully appreciate the importance of obtaining Mr. Markham's opinion and advice as to the best method of harvesting and preparing the bark.

20. Mr. McIvor has full permission to carry out the experiment proposed in paragraph 35, for extended mossaing.

21. The subject of completing the road to the Koondahs from Ootacamund will be considered in the Department Public Works.

22. The Government are glad to note the favourable terms in which Mr. McIvor notices the services of his assistants.

23. As requested, 300 copies of paragraphs 2 to 13 and 19 to 35 inclusive of the Report will be struck off separately, printed uniformly with the Manual, to which they will be added.

24. The account of the Botanical Gardens is very satisfactory, and the Government are glad to learn that a *catalogue raisonné* of its contents is under preparation.

25. In the tea plantation, which is intended to be a source for supplying seed to planters, seven acres have been planted with about 9,000 plants of the China and Assam varieties, and the plants have done well.

26. At the sites for the new Lawrence Asylums 10,300 Eucalyptus trees (blue gum and stringy bark) have been planted out for shelter in masses, bordered by some 6,000 trees of more ornamental kind.

27. The Government have to thank Mr. McIvor for the zeal and energy to which they are indebted for the valuable results recorded in the above Report.

28. His proposal to fix the future price for chinchona plants at one anna each when 5,000 and upwards are taken, and two annas each for any number under 5,000, is approved and sanctioned.

— No. 69. —

From the Superintendent, Government Chinchona Plantations, to the Acting Secretary to Government, Revenue Department, Fort St. George.

Ootacamund, 25 September 1865.

WITH reference to my letter No. 59, dated 16 August 1865, submitting the Report on the Government Chinchona Plantations and Botanical Gardens for 1864-65, I have the honour to inform you that in consequence of the result of Mr. Howard's analysis of the bark forwarded in May last, I beg to withdraw paragraphs 29 and 30 of the Report above alluded to, as the views set forth in these paragraphs now appear immature, and will require further consideration, and more experience, prior to their being laid before the public.

From the Superintendent, Government Chinchona Plantations, to the Private Secretary to His Excellency the Governor, Ootacamund; dated Ootacamund, 3 October 1865.

I HAVE the honour to enclose a copy of a detailed analysis by J. E. Howard, Esq., of Neilgherry Chinchona barks submitted in June last, and request the favour of your being so good as to submit the same to his Excellency the Governor, in order that it may be printed as an Appendix to my Report for 1864-65 on the Government Chinchona Plantations and Botanical Gardens.

Analysis of Chinchona Bark and Leaves. (Received 21 June 1865.)

From the Superintendent of the Government Chinchona Plantations, Ootacamund, to the Secretary to Government, Revenue Department; dated Ootacamund, 3 May 1865.

1. I HAVE the honour to forward, by banghy, a box containing a further supply of chinchona bark, as per Memorandum annexed, for transmission to the Right Honourable the Secretary of State for India, in order that it may be submitted to Mr. Howard for analysis and report.

2. The bark now forwarded was removed from the plants in the early part of April last, or as the sap begins to rise, as at this season the bark separates freely from the wood.

3. Specimens Nos. 2 and 3 are renewed barks; these attain extraordinary thickness in a short period of growth; and if they contain a proportionate quantity of alkaloids, this system of treating the plants appears to offer greater advantages than the other methods proposed.

4. I may observe, that further observation seems to establish that this system of removing strips of bark from the stems of the plants can be practised without injury, provided the wound is instantly covered with damp moss, inattention to covering the wounds having produced the bad effects detailed in my letter of the 17th March 1864.

MEMORANDUM.

Chinchona Succirubra.

No. 1. Bark of three years and five months' growth, thickened by the application of moss.

No. 2. Renewed bark of one year and five months' growth, being reproduced on the same portion of a stem which produced the bark given to Dr. De Vry in November 1863, and from which that gentleman obtained 8·409 per cent. of alkaloid.

No. 3. Renewed bark of one year's growth, and gathered from portions of the stem which yielded No. 1 bark, submitted to Mr. Howard in the spring of 1864.

No. 4. Bark of two years and five months' growth, not thickened by the application of moss.

Chinchona Calisaya.

No. 5. Bark of two years and five months' growth.

Chinchona Condamenia.

No. 6. Bark of one year and seven months' growth

Chinchona Micrantha.

No. 7. Bark of two years and five months' growth, thickened by the application of moss.

No. 8. Ditto of same growth, but not thickened by the application of moss.

(signed) *W. G. McIvor*,
Superintendent of the Government Chinchona Plantations.

REPORT of an Analysis of the Fourth Remittance of Bark from India.

From *J. E. Howard*, Esq., F.L.S., to the Under Secretary of State for India dated 1 August 1865.

I HAVE the honour to report that I received, and have during the past month devoted much careful attention to the analysis of, eight specimens of bark, referred to in a letter from Madras, dated 3rd May 1865.

The whole of the samples were in excellent condition, showing the care and skill bestowed on their cultivation. They contrasted most favourably with specimens from South America, of bark used at the present moment in the extraction of quinine.

The mode of analysis I have followed, in the present instance, is that which is employed to ascertain the commercial value, which rests almost entirely with the crystallizable sulphates, with perhaps some slight loss of the residuary product. The results will compare well with those given in Delondre's *Quinologie*.

No. 1 gave of cryst. sulphate, per 100 parts - - - - - 6.00
of alkaloid soluble in extra light ether - - - - - 0.94
of alkaloid insoluble in the above (therefore Chinchonine) 1.06

Memo.—The sulphate refined into white sulphate of quinine in appearance, but this did not stand the test used for commercial sulphate of quinine.

No. 2 gave of cryst. sulphate - - - - - 5.00
of alkaloid sol. in E. L. E. - - - - - 0.90
of alkaloid insol. in E. L. E. (Chinchonine) - - - - - 1.80

Memo.—Refined as above.

No. 3 gave of cryst. sulphate - - - - - 2.72
of alkaloids, sol. in alcohol - - - - - 7.00

Memo.—As I could only submit to examination 165 grains of the bark, the above result must be taken with reserve.

No. 4 gave of cryst. sulphate - - - - - 2.43
of alkaloid sol. in E. L. E. - - - - - 2.03
of alkaloid insol. in E. L. E. (chine.) - - - - - 0.60

Memo.—This specimen gave a product not refining quite so well as No. 1.

No. 5 gave of cryst. sulphate - - - - - 0.70
of alkaloid sol. in E. L. E. - - - - - 0.10
of ditto, ditto, but crystallized by evaporation - - - - - 0.26
of ditto, insol. in E. L. E. (chine.) - - - - - a trace.

Memo.—This sulphate did not stand the ether test.

No. 6 gave of cryst. sulphate - - - - - 0.90
of alkaloid sol. in E. L. E. - - - - - 0.60
of ditto insol. (chine.) - - - - - a trace.

Memo.—The tests showed quinine and chinchonidine.

No. 7 gave of cryst. sulphate - - - - - 5.82
of alkaloid sol. in E. L. E. (aricine) - - - - - 0.29
of alkaloid insol. in E. L. E. (chine.) - - - - - 0.39

Memo.—This sulphate is that of commercial quinidine, and contains probably no quinine.

No. 8 gave of cryst. sulphate - - - - - 1.26
of alkaloid sol. in E. L. E. - - - - - 0.60
of alkaloid insol. in E. L. E. (chine.) - - - - - a trace.

Memo.—The product similar to that of No. 7.

I beg to direct special attention to the remark, that the fine white crystallized sulphate of quinine, apparently made from the bark of *C. succirubra*, will not stand

stand the test which is employed to distinguish the pure article in commerce. The cause of this I stated in my first report, viz., that "the crystallizations obtained are mixed with sulphate of chinchonidine, which is commercially, but not medicinally, a disadvantage, and one which always attends the products of red bark." It is of course possible to separate the chinchonidine, but then this must very seriously diminish the per-centage of six per cent. I obtained from this gross product little more than four per cent. refined in the first instance (though more subsequently), and of this I ascertained about 10 per cent. as chinchonidine. This difficulty must be looked steadily in the face, and I would suggest that it may be obviated, either by a change being wrought in the opinion of the medical world as to the value of chinchonidine as a medicine, or by the plant being encouraged to produce quinine instead of chinchonidine.

The first might be, very probably, the result of a commission of inquiry composed of competent medical practitioners. I may mention that the late Dr. Royle entered zealously, at my suggestion, into the question, and satisfied himself by experiment as to the value of chinchonidine, but I am not aware that he left any written record of the result he attained. My own experiments confirm this view of the question, and I have shown* that this alkaloid (which must not be confounded with chinchonine) must have constituted, in the whole or in part, the therapeutic agent in the cure of the Countess of Chinchon, as also that it was the alkaloid successfully employed at Philadelphia. The second alternative may seem visionary at first sight, but when we consider the results at which Mr. McIvor has arrived, and, further, the circumstances under which chinchonidine is produced, this view of the case may be altered.

In No. 7 we have an illustration of what careful cultivation will do, as the plant *C. micrantha*, which (with its congeners the grey barks) produces largely and chiefly chinchonine in its native climate of Huanuco,† now produces a very small portion of chinchonidine, and a large quantity of the allied alkaloid, quinidine. This is, then, a hopeful change, if time should confirm the observation.

Then chinchonidine seems almost always to accompany quinine in greater or less abundance. It does so in the Calisaya of Bolivia, in the lancifolia barks of New Granada, and in various barks of Ecuador and Peru, and markedly in the best of the barks of Loxa. It is highly probable that a very slight circumstance in the growth may determine the production of one or other alkaloid. Dr. Herapath has shown, in a communication to the Royal Society, "Researches on the Chinchona Alkaloids,"‡ that the quinine and chinchonidine salts agree closely among themselves, and differ widely from the quinidine and chinchonine compounds.

I may further remark, that the *Chinchona succirubra* is a tree which varies greatly in its products in its native forests, and that the *Chinchona micrantha*, in Bolivia, approaches to the character of a Calisaya, as I have noticed under that head; its bark has a different appearance from that of Huanuco, and again this now sent home varies widely from either of the above. I noticed, in examination, the peculiar yellow colouring matter common, it seems, to all the forms of the plant, as I have before noticed.

The Calisaya bark sent this time by Mr. McIvor is, I fear, an illustration of the possibility of change in the wrong direction, as it contains far too large a per-centage of chinchonidine in proportion to the quinine. The appearance of the bark indicates a not very vigorous growth, or at all events it differs from that it assumes in its native locality. It would never be recognised as the bark of *Chinchona Calisaya*.

The bark No. 6 is recognised by an experienced dealer, as "thin rusty crown, worth 1 s. 3 d. to 1 s. 4 d. per lb."§ It is, I presume, the bark of the variety

* "Illustration of Nueva Quinologia, sub. voc. Chahuarguera."

† A peculiar climate, of which I have recorded Mr. Pritchett's description under head *C. micrantha*.

‡ Dated 19 June 1857.

§ From Messrs. Jenkin and Phillips to Mr. J. E. Howard:—"51, Lime-street, 21 July 1865: The sample of bark you left with us appears to be thin rusty crown, worth 1 s. 3 d.—1 s. 4 d. per lb. We thank you for the sight of it."

variety Bonplandiana, i.e., the Colorado del Rey, as brought home by Cross; it is remarked as more red than is customary with rusty crown.

As the quantity of bark in No. 1 and No. 4 was not exhausted in my experiments, I have returned 1,000 grains of each of these, thinking that it would be a satisfaction to the Government to engage Dr. de Vry, whose chemical skill and experience are so well known, in further researches on the subject.

ORDER, 31st October 1865.

Ordered, that the above letters be printed as Appendices to Mr. Melvor's letter, No. 59, dated 16th August 1865, submitting his Report on the Government Chinchona Plantations for 1864-65, recorded in G. O., dated 27th September 1865, No. 2325.

(signed) *W. Hudleston,*
Acting Secretary to Government.

— No. 70. —

From the Government of Madras to the Secretary of State for India.

Madras, 25 December 1865.

WE have the honour to forward, for your information, our Minutes and Order, marginally noted, on the condition of the Chinchona plantations, when visited by our President in October last. His Excellency's account of the present state of the different plantations will, we feel sure, be extremely gratifying to you.

2. The receipt, since these Minutes were penned, of your Despatch dated 30th September (No. 27, Public), has led us to postpone the consideration of the extent to which our operations shall be carried on. We shall reply separately to that Despatch, and meanwhile no change will be made without your sanction.

3. The construction of roads to the plantations will be carried on as rapidly as practicable, and if sufficient funds are not available from our ordinary Budget grant, we shall apply for a special grant, feeling certain that it is your wish that these very necessary works should be prosecuted with energy.

Enclosure in No. 70.

MINUTE by Sir *William Denison*, 30 October 1865.

1. DURING my visit to the Hills I have inspected the different Chinchona plantations, have made myself acquainted with the position, extent, present state, and means of development of each, and have, with the aid of the facts brought before the Government in the annual reports of Mr. McIvor, and especially in that of 1864-65, been able to arrive at the actual amount expended upon each of the plantations, while the analysis, by Mr. Howard, of the specimen of bark furnished to him from the different plantations, affords fair evidence of the quality of the material which the Government will be able to furnish. The only question, therefore, which remains undetermined, is the probable quantity of the yield per acre, and the return which the cultivation of the plant, under favourable condition as regards soil, exposure, moisture, &c., is likely to make for the capital expended upon it.

2. I will now proceed to lay before the Government the results of my observations, and to make such suggestions as may lead to the determination of the facts as regards the quantity of the annual returns, which remain as yet hypothetical, and to recommend the adoption of measures which will, I think, tend to encourage the application of private capital to the cultivation of Chinchona.

3. The first plantation which I visited was that in connection with the Botanic Garden at Otacamund. It will be remembered that, at the commencement of the experiments upon the cultivation of Chinchona, there was a difference of opinion between Mr. McIvor and Drs. Anderson and Macpherson as to the proper treatment of the plant; these latter gentlemen affirming that, in accordance with the example set by the Dutch in Java, the young plants should be placed under the shelter of older trees, while Mr. McIvor expressed an opinion that they would flourish better in situations exposed to the ordinary influences of the sun and atmosphere. The Government, in the absence of any positive information, decided that the two theories should be tested; that a certain number of acres of forest should be planted with Chinchona, while, as a general rule, the cultivation in the open should be adopted.

4. This

4. This was accordingly done. About 50 acres of forest, or what is termed the Dodabet plantation, in the immediate vicinity of the gardens, were planted with different species of Chinchona, while elsewhere the forest has been felled and burned, and the young Chinchona plants have been substituted for the forest trees. The present state of the Dodabet plantation is conclusive as to the propriety of adopting the system advocated by Mr. Melvor, for while in those portions of it where the Chinchona has been planted under the shelter of the forest, the plants are dwarfed, stunted, and exhibit but a very slight tendency to develop into trees: in situations identical, as regards soil, height, and aspect, but where the only difference is the absence of shelter, they are growing rapidly, and are strong, healthy, and well developed. The result, therefore, of my observation is conclusive as to the propriety of the course adopted by the Government at the suggestion of Mr. Melvor, in ordering the clearance of the forest from this plantation, a few acres, say 10, being left as evidences of the working of the two systems.

5. On the opposite slope of the same range of Dodabet Hills, and consequently with a different aspect, upwards of 700 acres of land have been reserved by the Government for the extension of this plantation; of these 350 acres have been cleared of timber, a portion of which has been planted with Chinchona, while, at the bottom of the forest land, a portion of grass land has been pared, cleaned, and planted, and the plants there appear to be doing as well as those which occupy the cleared portion of the forest.

6. The second plantation which I visited was that at Mailkoondah, on the eastern or north-eastern slope of the Koondahs. I experienced a good deal of difficulty in reaching the site of this plantation, which is in the heart of a forest of about 10,000 acres. When I arrived at the site, I found that little had been done beyond clearing about 170 acres of land, building a house for the superintendent, some huts for the labourers, and commencing a gaol for the prisoners by whose labour, principally, it is proposed to bring this plantation into cultivation. Were it the sole object of the Government to procure a supply of Chinchona bark for its own purposes, I should not have been disposed to recommend the maintenance of this plantation; but looking to the fact that the soil is far more rich than that of any of the other plantations, that there are several thousand acres of equally valuable land in the immediate vicinity, that the plantation will form a nucleus round which planters will congregate, I am inclined to recommend that it should be maintained, and that a good road should be opened to it with as little delay as possible. The Government has reserved at this site some 2,500 acres; but this is far in excess of its wants. I should recommend the retention of 500 acres, and that the rest should be thrown open to the public.

7. The third plantation which I visited was that at Pykara. In its present state this consists—

First. Of 40 acres, planted to the right and left of the road leading down by the side of the river from the upper to the lower falls. The difference of level, between the superintendent's house at the top of the hill and the dwellings of the labourers at the garden, is said to be about 2,000 feet.

Second. Of about 100 acres of land on the eastern and north-eastern slopes of the Neilgherries, looking into Mysore, of which about 60 are planted, and the remainder are cleared and in a state to be planted early next season.

Third. Of a tract of land on the opposite or left bank of the Pykara River, which Mr. Melvor has commenced to clear, and a portion of which will be ready for planting early next year. The land on the right bank of the river is very stony, and portions of it are dry; the plants, however, seem to be doing well. I was not able to get across the river to the ground under clearance, but I was told by Mr. Melvor that the soil was superior to that on the opposite bank.

8. The fourth plantation which I visited was the principal one at Neddivuttum. This was commenced in 1861, and about 27,000 plants were put out during the rainy season of 1862. The quantity of land actually planted with Chinchona is about 300 acres, but additional portions have been cleared, much of which is ready to receive plants. The whole plantation, where the land now cleared is occupied, will comprise an area of 500 acres. Nothing can look better than the plants which have been three years in the ground. They were placed at distances of 10 and 12 feet apart, which experience has shown to be farther than necessary; 7 feet apart, which, including the area taken up by drains, path-roads, &c., will give about 800 plants to the acre, is the distance now adopted. The three year old plants are 10 or 11 feet high, have stems 9 or 10 inches in circumference, and they throw out branches forming a large head. Notwithstanding the effects of a violent gale and a hail storm which had visited the plantation a few days before my arrival, and which had stripped off a good many leaves, the plants looked remarkably well. Where, however, the wind had the power of sweeping up the valleys, it showed evidence of its action in branches broken and bark rubbed off.

9. I inspected carefully several plants which had been cut down last year, a few days previous to my visit, and was gratified to find that most of them had thrown up fresh shoots, which, in the course of twelve months, had attained a height of full three feet, and exhibited a joint circumference very much in excess of that which the parent plant would have attained to. I was the more gratified to see this as it strengthened an opinion I had already formed as to the possibility of treating the Chinchona plantations as coppice-wood is dealt with in England, that is, by cutting it down when the annual development of bark has arrived at its maximum, say, every five or six years. The period during which the

coppice-wood must be allowed to grow would of course have to be determined by experience, and I now suggest that a series of experiments should be made for the purpose of furnishing the Government with data upon which the probable annual returns may be calculated.

10. It has already sanctioned an experiment suggested by Mr. McIvor, viz., that of stripping off a portion of the bark of each tree over an area of about 10 acres, and I think it would be advisable to cut down this year, say, three acres of the three-year old plants, allowing them to throw up shoots from the stools, and to carry on the process annually over about the same area, so as to arrive, by direct experiment, at satisfactory information—

First. As to the value of the yield in favourable situations of an acre of a given species of Chinchona, three or four years old.

Second. As to the annual rate at which the bark increases on the tree.

Third. As to the per-centage of alkaloids in bark of different ages.

Fourth. As to the most profitable mode of treating the plant as a produce of bark.

11. Mr. McIvor is experimenting largely upon the effect of covering the bole of the trees with moss, both as a means of increasing the thickness and weight of bark, and of adding to the quantity of the alkaloids contained in a given weight. He deserves every credit for the zeal and energy with which he has applied himself to the study of the subject of the production of these alkaloids, and for the skill with which he has devised experiments for the purpose of illustrating his views. The result of these experimental inquiries will, in all probability, be evidenced by a large increase in the annual value of the return from the plantations.

12. I will now say a few words as to the work which remains to be done, both at the plantations themselves and in improving the means of communication with them; before, however, I can express any opinion as to the work which remains to be done, the Government must come to some decision as to the extent of land which it is prepared to bring under cultivation.

13. I have said before that at Neddiwuttum about 300 acres of land are planted, and 200 more will be ready to plant in the course of next year and the year after; these 500 acres will absorb nearly all the land within the existing limits, and I should not be disposed to add to this quantity. At Pykara 100 acres are planted, 60 acres are prepared, and some 80 or 90 acres are in course of preparation, while there is land of good quality which would admit of an extension of 200 acres, without pushing the clearance beyond the spot which it has now reached; if thus the plantation at Pykara be limited at present to 250 acres of Chinchona, and, say, 300 acres of land additional to this, it will, in my opinion, be quite sufficient, and I should recommend that the land reserved by Mr. McIvor, in excess of this amount, should be thrown open for selection to the public. At the Dodabet plantation there are 75 acres already planted; there are the means of extending this to 250 acres, and this would be sufficient for all the purposes of the experiment. The reserve of 750 acres to the east of the hill is more than can be ever required, and I should be disposed to recommend that 300 acres, in addition to the 250 acres planted, should be reserved by the Government, and that the rest should be sold. Mr. McIvor should be called upon to mark out the boundaries of the land he wishes to reserve, to the amount of 300 acres or thereabout, in addition to the planted land, and the remainder should be sold in one or two blocks, as convenient, without reference to its position, should it be within the limits of the cantonment. At Mailkoondah, as stated above, 2,500 acres have been reserved; I should limit the amount of cultivation here to 200 acres, and the whole area of land within the Government boundary to 500 acres.

14. It will be seen, with reference to the above figures, that the amount of land under cultivation will be as follows:

	<i>Acres.</i>
Neddiwuttum - - - - -	500
Pykara - - - - -	250
Dodabet - - - - -	250
Mailkoondah - - - - -	200
	1,200
To this will be added, say, as a reserve—	
Neddiwuttum - - - - -	100
Pykara - - - - -	300
Dodabet - - - - -	300
Mailkoondah - - - - -	300
	1,000
The total area will be of—	
Neddiwuttum - - - - -	500 + 100 = 600
Pykara - - - - -	250 + 300 = 550
Dodabet - - - - -	250 + 300 = 550
Mailkoondah - - - - -	200 + 300 = 500
Making a Total of Acres - - -	2,200

The first thing to be done, as soon as the area of the different plantations, present and future, is decided, is to have a plan on a large scale made of each. The Government ought to be in possession of a plan of its own estate, and the public ought to know where the appropriated land ends and that begins which is open to selection. Instruction should be given to the surveyor to enclose the plantation within straight lines, and to give the figure of the enclosed portion as few sides as possible; his work will be rendered much easier by this, which ought to be laid down as a rule to guide surveyors in general. The boundaries will be more easily marked, and any man will be able to determine for himself the area of land which will include the amount which he wishes to purchase.

15. The next thing to be done is to lay out roads, by which the produce of the plantation and the stores for the maintenance of the men can be easily conveyed to and from the market. From Neddiwuttum, for instance, when the plantation is in full bearing, about 100 acres will be cut down every year, and the produce of each acre may be put roughly at one ton of bark, so that 100 tons will have to be moved to market every year; the same rule will apply to the other plantations. The new trace from Neddiwuttum to Ootacamund, which will answer as the line from the Goodaloor Ghaut, will answer every purpose of the establishment, and should be completed as fast as the means at the disposal of the Government will permit. From Pykara a branch requires to be made to join the above new trace; it may be a matter of question whether this should be carried upon the right or the left bank of the river. A bridge must at all events be made at some point between the upper and the lower fall, to enable the superintendent to cross the river at all seasons.

16. To Mailkoondah a new road must be opened with as little delay as possible. I have been told that there is a fair line from the Devi Shola, following down a line of watershed to the stream which flows into the Bowaney, and that a similar watershed will be found on the opposite side leading up to the Koondahs. I have spoken on the subject to Major Farewell, and directed him to turn his attention to this line of road at once, as it is of special importance that it should be opened out with as little delay as possible. It would be advisable to place on the estimates for the next year such a sum as would be sufficient to push forward such of these roads as are of the most importance, and specially to provide for the construction of the bridge over the affluent of the Bowaney, which should be of a solid description, for the floods come heavily down this river, and the whole communication with the Government and the other plantations will depend upon this bridge.

(signed) *W. T. Denison.*

30 October 1865.

— No. 71. —

From the Conservator of Forests to the Acting Secretary to Government,
Revenue Department, Fort Saint George.

Bombay, 30 October 1865.

1. I BEG to report my return to duty yesterday, with the permission of the Right Honourable the Secretary of State for India, and my intended departure in two days for Madras.

2. Mr. Clements Markham, to whom we are indebted for the introduction of the Chinchona plants from South America, is here, and proceeds by the same steamer (upon 1st proximo) to inspect the Chinchona plantations in Ceylon, and thence, *via* Courtallum and Cochin, to the Neilgherries. He has expressed a wish that I should accompany him.

3. It was proposed by the Government in 1860 that I should visit Ceylon, on duty, but this was not accomplished, as my services were soon after required in the Punjab. I have not visited the Tinnevely Hills, and believe that it might be to the advantage of the department in which I have the honour to serve if Mr. Markham and I were associated at this time.

4. If this proposal should meet with the approval of His Excellency the Governor, I request the favour of a telegram to await arrival at Calicut on 4th proximo, to enable me to arrange my movements accordingly.

— No. 72. —

ORDER of the Madras Government.

8 November 1865.

DR. CLEGHORN has been already informed by telegram that the Government cannot sanction his proceeding to Ceylon on duty. His return to duty will be gazetted.

— No. 73. —

EXTRACT of a LETTER from Mr. *Clements Markham* to the Under Secretary of State for India.

Sir,

Guindy Park, Madras, 14 February 1866.

IN continuation of my letter, dated at Ootacamund on 26th December 1865, I now have the honour to report my subsequent proceedings up to 10th February, the day on which I arrived at Madras.

2. I was occupied, during my stay in the Neilgherries, in inspecting the Chinchona plantations, trying experiments on the bark, and discussing numerous questions of detail, in the cultivation, with the superintendent. I have since submitted my views on the whole subject for the consideration of the Government of Madras in a report, a copy of which has already been forwarded to your address by the Secretary to the Government of Madras in the Revenue Department.* It will, in due course, be submitted for the consideration of the Secretary of State in Council, together with the minutes and orders of the Madras Government; and I therefore defer any further remarks bearing on the recommendations contained in it for the present.

* An uncorrected proof.

3. I may be permitted, however, to give expression to the great pleasure I experienced on seeing the results of my labours, representing as they do so complete and undeniable a success. When I selected the sites for plantations in 1860-61, they were covered with dense jungle. Now the scene is so altered as to be beyond recognition: acres of ground are covered with rows of Chinchona trees, with their lustrous crimson-veined leaves and fragrant flowers; and in one place they have grown to such a size that the foliage of their branches mingles and entirely conceals the ground. They have become so important and distinctive a feature of the fine range which overhangs the Moyaar Valley, that it should be known henceforth as the Chinchona mountains.

4. Private enterprise on the Neilgherries is following close on the heels of the Government operations. Mrs. Morgau has an establishment for propagating and distributing Chinchona plants. Mr. Money is opening a fine estate of 500 acres in the Deva-sholah, the largest forest on the Neilgherries. Colonel Fyers has an estate on the Koondahs; Colonel Denison and Captain Jennings have commenced planting near Ootacamund; the Carnatic Company above Neddiwuttum; Colonel Scott at Maillor; Mr. Grove and Mr. Morgan near the Pycarrah Falls; Dr. Colvin Smith and others at Kotergherry; and of the 85 persons who have purchased land on the Neilgherry Hills, under the Waste Land Rules of 6th March 1863, as many as 50 have undertaken Chinchona cultivation. The species thriving at high elevations will soon cover hundreds of acres of land on the Neilgherry plateau.

Enclosure No. 1.

5. I enclose a list of purchasers of land on the Neilgherry Hills, under the Waste Land Rules, with the localities, and the extent of each purchase. The total area purchased from Government amounts to upwards of 8,000 acres.

6. I left the Neilgherry Hills on the 16th of January to visit the important district of Wynaad, by way of Calicut, the Nelemboor teak plantations, and the Carcoor Ghaut. My object was to judge of the capabilities of Wynaad as a Chinchona yielding district, to ascertain the exact extent that the cultivation has been or is likely to be undertaken by the planters, and to collect information which would enable me to recommend some measure to the Government with a view to its spread amongst native cultivators.

7. I have

7. I have since submitted a report on the subject, in continuation of paragraph 40 of my former report. An admirable proposal, made by the Collector of Malabar, to spread Chinchona cultivation widely in the gardens and small holdings of the native Wynaad proprietors, had been rejected by the Madras Government in 1864. Their decision is much to be deplored, as it has thrown back the spread of bark cultivation, in the most feverish district in the Presidency, for two years. But I still hope that my report may induce the Government to reconsider their refusal to allow the fever-stricken people of Wynaad to be supplied with Chinchona plants. I enclose a copy of Mr. Ballard's letter on the subject.

Enclosure, No 2.

8. While engaged on my special duty connected with Chinchona cultivation I rode backwards and forwards over every part of the Wynaad district, examined all the roads, whether Imperial or district, and endeavoured to collect all available information as to the requirements of this great centre of European and native planting operations. I rode on an average 30 miles a day, under a blazing sun, at a time when fever was raging, for 16 days; and spared no pains to obtain accurate information on all points, by careful personal inspection, and by conversations with Government officials and with planters. I have embodied my observations in a report, which I shall forward to your address as soon as it is completed.

9. I am happy to be able to report that the Rajah of Travancore has cordially adopted our recommendations with reference to the Chinchona establishment at Peermede.

Enclosure 1, in No. 73.

LIST OF LANDS Purchased on the Neilgherry Hills, under the Waste Land Rules of 6 March 1863.

Number.	NAME OF PURCHASER.	Extent in Acres.	LOCALITY.
1	Messrs. Vincent and Dr. Tacien - - - - -	50	Kartairy.
2	Mr. H. R. Grimes - - - - -	20	Sentinel Rock.
3	Mr. W. Mullaly - - - - -	300	Chengal & Coomal Valley.
5	Nunjapa Rao - - - - -	100	Coonoor.
6	Mr. W. Mullaly - - - - -	200	Neerally Valley.
7	Mr. J. Hayne - - - - -	50	Droog Hill.
8	Mr. T. Stanes - - - - -	80	Burlyar.
9	Mr. J. Hunter - - - - -	300	Pilloor Valley.
10	Ditto - - - - -	47	Ditto.
11	Ditto - - - - -	185	Ditto.
12	Captain W. Daly - - - - -	6	Kalhutti.
13	Major C. P. Taylor and Colonel Denison - - - - -	200	Ootacamund.
14	Major E. L. Grant - - - - -	30	Wellington.
15	Mr. J. H. Schnarri - - - - -	300	Koondahs.
16	Mr. C. E. Eckersall - - - - -	5	Ootacamund.
17	Mr. A. L. Brown - - - - -	150	Kodanaad.
18	Ditto - - - - -	150	Ditto.
19	Mr. H. R. Grimes - - - - -	500	Orange Valley.
20	Ditto - - - - -	500	Ditto.
21	Mr. Herklots - - - - -	200	Nerally.
22	Mr. Robinson - - - - -	15	Kotagherry.
23	Reverend DeGelis - - - - -	2	Coonoor.
24	Mr. T. Kay - - - - -	40	Ditto.
25	Lieutenant Jennings - - - - -	180	Ootacamund.
26	Mr. H. R. Dawson - - - - -	250	Nellapatam.
27	Commander Mitcheson - - - - -	250	Munjacombay.
28	Captain Fuller - - - - -	300	Moolasapey.
29	Mr. E. Smith - - - - -	7	Coonoor.

LIST of Lands Purchased on the Neilgherry Hills, &c.—*continued.*

Number.	NAME OF PURCHASER.	Extent in Acres.	LOCALITY.
30	Dr. Rogers - - - - -	20	Ootacamund.
31	Mr. C. Sanderson - - - - -	200	Coonoor.
32	Mr. R. F. Phillips - - - - -	200	Kodanaad.
33	Ditto - - - - -	50	Ditto.
34	Ditto - - - - -	50	Ditto.
35	Major C. P. Taylor - - - - -	20	Ootacamund.
36	Major H. Sweet - - - - -	125	Colcombay.
37	Dr. J. Miller - - - - -	11	Ootacamund.
38	Mr. F. A. Groves - - - - -	20	Pycarra.
39	Colonel Dobbie - - - - -	10	Ditto.
40	Colonel Woods - - - - -	5	Ootacamund.
41	Mr. Money - - - - -	500	Deva Shola.
42	Mr. J. H. Findlay - - - - -	50	Kodanaad.
43	Ditto - - - - -	30	Ditto
44	Mr. E. B. Thomas - - - - -	200	Ditto.
45	Mr. R. F. Phillips - - - - -	50	Ditto.
46	Ditto - - - - -	2	Coonoor.
47	Reverend DeGelis - - - - -	1	Ditto.
48	Major Grant - - - - -	30	Ditto.
49	Mr. E. B. Thomas - - - - -	2	Ditto.
50	Mr. J. Morgan - - - - -	300	Pycarra.
51	Captain Gerrard - - - - -	5	Coonoor.
52	Captain Fuller - - - - -	2	Keelkotagherry.
53	Mr. Brown - - - - -	25	Kodanaad.
54	Major C. P. Taylor - - - - -	50	Ootacamund.
55	Dr. Stewart - - - - -	37	Ditto.
56	Mr. Misquith - - - - -	50	Ditto.
57	Major C. P. Taylor - - - - -	20	Ditto.
58	Colonel Young - - - - -	4	Coonoor.
59	Mr. Wait - - - - -	15	Ditto.
60	Dr. Stewart - - - - -	30	Ootacamund.
61	Colonel Denison - - - - -	150	Ditto.
62	Major Morgan - - - - -	30	Ditto.
63	Mr. Ouchterlony - - - - -	9 $\frac{1}{2}$	Ditto.
64	Mr. Hill - - - - -	0 $\frac{1}{10}$	Coonoor.
65	Mr. Liddell - - - - -	13	Ootacamund.
66	Mr. Story - - - - -	20	Coonoor.
67	Captain Berkeley - - - - -	9	Ditto.
68	Theeroovengdum - - - - -	30	Ootacamund.
69	Mr. R. F. Philips - - - - -	3	Coonoor.
70	Mr. Reily - - - - -	2	Ditto.
71	Carnatic Coffee Company - - - - -	200	Pycarra.
72	Mr. R. F. Philips - - - - -	150	Koondahs.
73	Mr. Warburton - - - - -	60	Ootacamund.
74	Mr. Moss - - - - -	40	Ditto.
75	Mr. Granaburnum - - - - -	10	Ditto.
76	Kristnasawmy - - - - -	20	Ditto.
77	Captain Berkeley - - - - -	20	Coonoor.
78	Mr. C. Sanderson - - - - -	30	Ditto.
79	Mr. S. Davis - - - - -	10	Ditto.
80	Mr. T. Stanes - - - - -	6	Ditto.
81	Mr. Stonehewer - - - - -	1	Ditto.
82	Mr. Gerrard - - - - -	4	Ditto.
83	Colonel Cooper - - - - -	66	Kotagherry.
84	Mr. J. Allamby - - - - -	50	Ootacamund.
85	Colonel Scott - - - - -	300	Teimullay (Mailloor).
TOTAL - - -		8,075	

— No. 74. —

From the Government of Madras to the Under Secretary of State for India.

Madras, 6 February 1865.

WE have the honour to forward for your information the accompanying Tabular Report on the number, condition, &c., of the Chinchona plants on the Neilgherries, on the 31st December 1865.

Enclosure in No. 74.

REPORT on the Number, Distribution, and Condition of Chinchona Plants on the Neilgherries, on 31 December 1865.

Species.	Botanical Names.	Commercial Names.	Number of Plants.	Value per Lb. of Dry Bark in the London Market.	REMARKS.
1	<i>C. succirubra</i> - -	Red Bark - -	284,276	s. d. 2 6 to 8 9	The number of plants planted out in the plantations remain the same as in last month, namely, 244,871.
2	<i>C. Calisaya</i> , var. <i>Fru-</i> <i>tex</i> , var. <i>vera</i> .	Yellow Bark - -	3,156	2 10 to 7 -	
3	<i>C. officinalis</i> , var. <i>Con-</i> <i>daminea</i> (<i>C. Uritu-</i> <i>singa</i>).	Original Loxa Bark -	8,189	2 10 to 7 -	
4	<i>C. officinalis</i> , var. <i>Bon-</i> <i>plandiana</i> (<i>C. Cha-</i> <i>huarguera</i>).	Select Crown Bark -	611,488	2 10 to 7 -	The increase by propagation is 53,403, being 1,548 above the average of the last six months, making the total number of plants 941,257.
5	<i>C. crespilla</i> - -	Fine Crown Bark -	3,879	2 10 to 6 -	
6	<i>C. lanceifolia</i> - -	Pitayo Bark - -	159	1 8 to 2 10	
7	<i>C. nitida</i> - -	Genuine Grey Bark -	2,786	1 8 to 2 9	Unknown.
8	<i>C. Species</i> without name.	Fine Grey Bark -	8,500	1 8 to 2 10	
9	<i>C. micrantha</i> - -	Grey Bark - -	15,010	1 8 to 2 9	
0	<i>C. Peruviana</i> - -	Finest Grey Bark -	3,389	1 8 to 2 10	Unknown.
1	<i>C. Pahudiana</i> - -	Unknown - -	425	Unknown.	
TOTAL Number of Plants - - -			941,257		

TABLE II.

MEMORANDUM of the Growth of Eleven Plants of *C. succirubra*, planted on the Second Denison Plantation, at Neddivuttum, on 30 August 1862.

Number of Plants.	Height in Inches when Planted on 30 August 1862.	Height in Inches on 30 November 1865.	Height in Inches on 31 December 1865.	Growth in Inches during December 1865.	By whom Planted.
1	23	129 $\frac{3}{4}$	131	1 $\frac{1}{4}$	His Excellency Sir W. Denison.
2	16 $\frac{1}{2}$	115 $\frac{1}{2}$	117 $\frac{1}{4}$	1 $\frac{3}{4}$	
3	19	116 $\frac{1}{2}$	119	2 $\frac{3}{8}$	
4	15	110 $\frac{1}{2}$	110 $\frac{1}{2}$	-	J. W. Breeks, Esq.
5	27	134	134 $\frac{1}{4}$	$\frac{1}{4}$	
6	20	107 $\frac{1}{2}$	107 $\frac{1}{2}$	$\frac{1}{4}$	
7	20	119	122 $\frac{1}{2}$	3	Dr. Sanderson.
8	18	123 $\frac{1}{4}$	124 $\frac{1}{2}$	$\frac{1}{4}$	
9	20	128	129 $\frac{3}{8}$	1 $\frac{3}{8}$	
10	20	129	130 $\frac{1}{2}$	1 $\frac{1}{2}$	Lieutenant McLeod.
11	18	111	112 $\frac{1}{2}$	1 $\frac{1}{2}$	
12	- -	78 $\frac{1}{2}$	82	3 $\frac{1}{2}$	Plant cut down for bark.

TABLE II. exhibits the growth of 11 plants of *C. succirubra* planted out by his Excellency the Governor and other gentlemen at Neddivuttum on the 30th August 1862. The average growth of these plants during the month is 1 $\frac{3}{4}$ inches, or about the same as last month.

One of the two plants cut down on the 20th of March 1863 for the bark, submitted to Mr. Howard for analysis, has made strong shoots of 82 inches in height, giving the growth of 3 $\frac{1}{2}$ inches during the month.

TABLE III.—SHOWING the Height of Twelve Plants of *C. officinalis*, planted on the Dodabetta Plantation at Ootacamund, on 30 September 1863.

Number of Plants.	Height in Inches when Planted on 30 September 1863.	Height in Inches on 30 November 1865.	Height in Inches on 31 December 1865.	Growth in Inches during December 1865.	REMARKS.
1	19	103 $\frac{1}{2}$	106 $\frac{1}{2}$	3	The twelve plants of <i>C. officinalis</i> (ashrubby species) on the Dodabetta Plantation gives an average growth of 3 inches, or $\frac{1}{2}$ th of an inch under the growth of last month.
2	14 $\frac{1}{2}$	93	95	2	
3	28	103 $\frac{1}{2}$	107	3 $\frac{1}{2}$	
4	22	101	103 $\frac{1}{2}$	2 $\frac{1}{2}$	
5	21 $\frac{1}{2}$	103 $\frac{1}{2}$	107	3 $\frac{1}{2}$	
6	28	117	119 $\frac{1}{2}$	2 $\frac{1}{2}$	
7	22 $\frac{1}{2}$	98 $\frac{1}{2}$	101	2 $\frac{1}{2}$	
8	21 $\frac{1}{2}$	97	100 $\frac{1}{2}$	3 $\frac{1}{2}$	
9	21 $\frac{1}{2}$	109 $\frac{1}{2}$	113	3 $\frac{1}{2}$	
10	19 $\frac{1}{2}$	101 $\frac{1}{2}$	104 $\frac{1}{2}$	3	
11	24	106	109 $\frac{1}{2}$	3 $\frac{1}{2}$	
12	24	105	108	3	

TABLE IV.—REGISTER of Chinchona Plants Distributed.

NAMES.	STATION.	Number of Plants.	
Mr. F. N. Maltby - - - -	Travancore - - -	16	The total number of plants distributed is 83,676.
Dr. Junghuhn - - - -	Java - - -	56	
Mr. A. R. Lascelles - - - -	Ootacamund - - -	12	
Mr. M. Anderson - - - -	Jamaica - - -	2	
Dr. Wiche - - - -	Bombay - - -	10	
Dr. T. Anderson - - - -	Calcutta - - -	554	
Dr. Jamieson - - - -	Saharanpore - - -	107	
Professor Lees - - - -	Calcutta - - -	547	
Rajah of Travancore - - - -	Travancore - - -	521	
Major Morgan - - - -	Ootacamund - - -	1,534	
Mr. E. T. Fitzgerald - - - -	Calcutta - - -	558	
Mr. J. W. B. Money - - - -	- ditto - - -	1,369	
Mr. W. Bourne - - - -	- ditto - - -	532	
Captain Cox - - - -	Wynad - - -	6	
Mr. Hollock - - - -	- ditto - - -	2	
Mr. T. Sheffield - - - -	Ootacamund - - -	12	
Dr. F. Day - - - -	Cochin - - -	100	
Mr. Brown - - - -	Tellicherry - - -	12	
Mr. J. Hall - - - -	Ootacamund - - -	144	
Mr. T. Knop - - - -	- ditto - - -	18	
Captain Lees - - - -	Bengal - - -	281	
Mr. W. H. Rayne - - - -	Manantoddy - - -	424	
Rev. — Sawyer - - - -	Ootacamund - - -	1,018	
Mr. Frend - - - -	- ditto - - -	512	
Mr. Hollock - - - -	- ditto - - -	1	
Mr. J. Pierie - - - -	Seegoor - - -	12	
Colonel Scott - - - -	Ootacamund - - -	1,236	
Mr. Berend - - - -	Cachar - - -	275	
Rev. J. Hunter - - - -	Coonoor - - -	12	
Mr. J. Mullaly - - - -	- ditto - - -	24	
Mr. W. H. Stanes - - - -	- ditto - - -	1,262	
Colonel R. Cooper - - - -	Kotagherry - - -	12	
Mr. F. Cockburn - - - -	- ditto - - -	12	
Colonel Woodfall - - - -	Coonoor - - -	12	
Mr. C. Anderson - - - -	- ditto - - -	24	
Colonel Angelo - - - -	Ootacamund - - -	12	
Rev. E. Laseon - - - -	- ditto - - -	12	
Captain R. N. Taylor - - - -	Coorg - - -	96	
Major W. Agnew - - - -	Assam - - -	139	
Mr. V. H. Levinge - - - -	Madura - - -	12	
Chief Commissioner of - - - -	Nagpore - - -	28	

TABLE IV.—Register of Chinchona Plants Distributed—*continued.*

NAMES.	STATION.	Number of Plants.	REMARKS.
Mr. Fletcher - - - -	Ootacamund - - -	24	
Gool Mahomed - - - -	- ditto - - -	20	
General McCleverty - - -	New Zealand - - -	23	
Mr. W. Robinson - - - -	Kotagherry - - -	330	
„ Crake - - - -	Wynad - - -	12	
„ H. R. Dawson - - - -	Seegoor - - -	12	
Captain Mann - - - -	Coorg - - -	48	
Mr. E. Roberts - - - -	- ditto - - -	530	
„ H. Russell - - - -	Wynad - - -	52	
Rev. -- Wait - - - -	Coonoor - - -	2	
Collector of Belgaum - - -	Belgaum - - -	28	
„ „ Honore - - - -	Honore - - -	28	
Dr. Ross - - - -	- ditto - - -	15	
His Excellency the Governor -	Bombay - - -	158	
Mr. H. Hinde - - - -	Wynad - - -	12	
„ E. B. Thomas - - - -	Coonoor - - -	74	
Rajah of Poonganoor - - -	Poonganoor - - -	12	
Major Grant - - - -	Wellington - - -	226	
Messrs. Thomson, Shaw & Co.	Poonganoor - - -	28	
Mr. J. H. Trinson - - - -	- ditto - - -	31	
Dr. Muller - - - -	Melbourne - - -	28	
Mr. Tyrrell - - - -	Mysore - - -	12	
Dr. Sayers - - - -	Vellore - - -	12	
Major C. P. Taylor - - -	Ootacamund - - -	5,250	
Dr. Wilson - - - -	- ditto - - -	6	
Mr. Schnarrie - - - -	- ditto - - -	15,000	
Captain Fuller - - - -	Coonoor - - -	417	
Dr. Drummond - - - -	Ootacamund - - -	224	
Captain Jennings - - - -	- ditto - - -	1,756	
Lieut. H. B. Montmorency -	Bangalore - - -	6	
Mr. McHutchin - - - -	Ootacamund - - -	3	
Colonel Molesworth - - -	- ditto - - -	6	
Mr. C. Gray - - - -	Coonoor - - -	12	
„ H. B. Leddell - - - -	Ootacamund - - -	12	
„ Minchin - - - -	Wynad - - -	1,600	
His Excellency the Governor -	Vizagapatam - - -	35	
Mr. R. F. Phillips - - - -	Kotagherry - - -	1,117	
Colonel Cooke - - - -	- ditto - - -	24	
Mr. G. J. Glasson - - - -	Wynad - - -	1,000	
Dr. Macpherson - - - -	Mercara - - -	400	
Mr. W. H. Kerr - - - -	Coorg - - -	3,100	
„ James - - - -	Ootacamund - - -	1,000	
Colonel Whish - - - -	Bengal - - -	82	
Mr. K. Mair - - - -	Calcutta - - -	1,180	
„ W. Shakespear - - - -	- ditto - - -	61	
„ E. E. Meakin - - - -	- ditto - - -	168	
„ C. Ackland - - - -	- ditto - - -	150	
„ K. McIver - - - -	- ditto - - -	124	
„ Havelock - - - -	Ootacamund - - -	12	
„ H. de Facien - - - -	Kartairy - - -	6,821	
Major Sweet - - - -	- ditto - - -	910	
Captain Campbell - - - -	Bangalore - - -	6	
Royal Gardens - - - -	Mauritius - - -	36	
Honourable W. R. Arbuthnot -	Wynad - - -	93	
Mr. H. Maxwell - - - -	Bombay - - -	50	
Mrs. C. Smith - - - -	Wynad - - -	316	
Captain Beckley - - - -	Wellington - - -	200	
Mr. Walsh - - - -	Salem - - -	100	
His Excellency the Governor General.	Java - - -	175	
Captain Richardson - - - -	Kulhatty - - -	509	
Rajah of Poonganoor - - -	Poonganoor - - -	24	
His Excellency the Governor -	Madras - - -	24	
Mr. J. W. B. Money - - - -	Ootacamund - - -	25,000	
Captain Mitcheson - - - -	- ditto - - -	50	
Mr. R. H. Elliot - - - -	Munjerabad - - -	157	
His Excellency the Governor General.	Goa - - -	252	
Colonel Phayre - - - -	Rangoon - - -	152	
Mr. Ryall - - - -	Kotagherry - - -	24	
„ J. Gordon - - - -	Coonoor - - -	1,701	
„ J. Rohde - - - -	Neddivuttum - - -	100	
„ J. Higginbotham - - - -	Goodaloor - - -	12	

TABLE IV.—Register of Chinchona Plants Distributed—*continued*.

NAMES.	STATION.	Number of Plants.	REMARKS.
Mr. S. Pitot - - - -	Mauritius - - -	36	
„ J. Horne - - - -	- ditto - - -	36	
„ Edward Cremary - - -	Reunion - - -	51	
For the French Government - - -	Algiers - - -	45	
Mr. J. B. Norton - - - -	Shevaroy - - -	50	
„ Mackay - - - -	Punjab - - -	50	
„ W. Forsyth - - - -	Central Provinces - -	169	
Colonel Cadell - - - -	Coorg - - -	62	
Mr. J. L. Browning - - - -	Wynad - - -	4	
„ H. Leeds - - - -	Burmah - - -	112	
Maloo Sait - - - -	- ditto - - -	6	
Mr. A. D. Brown - - - -	Dimhuty - - -	53	
„ J. C. Misquith - - - -	Ootacamund - - -	300	
TOTAL Number of Plants - - -		83,676	

Ootacamund,
17 January 1866.

(signed) W. G. McIvor,
Superintendent, Government Chinchona Plantations.

— No. 75. —

From the Government of Madras to the Secretary of State for India.

Madras, 10 March 1866.

WE have the honour to forward, for your information, the accompanying Tabular Report on the number, condition, &c., of the Chinchona plants on the Neilgherries on the 31st January 1866.

Enclosure in No. 75.

REPORT on the Number, Distribution, and Condition of Chinchona Plants on the Neilgherries, on the 31st January 1866.

No. of Species.	Botanical Names.	Commercial Names.	Number of Plants.	Value per Lb. of Dry Bark in the London Market.	REMARKS.
				<i>s. d. s. d.</i>	
1	C. succirubra - - -	Red Bark - - -	288,477	2 6 to 8 9	The number of plants planted out in the plantations remain the same as in last month, namely, 244,871.
2	C. Calisaya, var. Frutex, var. Vera.	Yellow Bark - - -	3,156	2 10 to 7 -	
3	C. officinalis, var. Condaminea (C. Uritusinga).	Original Loxa Bark -	8,269	2 10 to 7 -	
4	C. officinalis, var. Bonplandiana (C. Chahuarguera).	Select Crown Bark -	649,552	2 10 to 7 -	The increase by propagation is 42,894, being 11,082 under the average of the last six months, making the total number of plants 984,143.
5	C. crespilla - - -	Fine Crown Bark - -	4,880	2 10 to 6 -	
6	C. lancifolia - - -	Pitayo Bark - - -	159	1 8 to 2 10	
7	C. nitida - - -	Genuine Grey Bark	2,786	1 8 to 2 9	
8	C. species without name.	Fine Grey Bark - -	8,500	1 8 to 2 10	
9	C. micrantha - - -	Grey Bark - - -	15,050	1 8 to 2 9	
10	C. Peruviana - - -	Finest Grey Bark -	3,389	1 8 to 2 10	
11	C. Pahudiana - - -	Unknown - - -	425	Unknown.	
TOTAL Number of Plants - - -			984,143		

TABLE II.

MEMORANDUM of the Growth of Eleven Plants of *C. succirubra*, planted on the Second Denison Plantation, at Neddivuttum, on the 30th August 1862.

Number of Plants.	Height in Inches when Planted on the 30th August 1862.	Height in Inches on the 31st December 1865.	Height in Inches on the 31st January 1866.	Growth in Inches during January 1866.	By whom Planted.	REMARKS.
1	23	131	131 $\frac{3}{4}$	$\frac{3}{4}$	His Excellency Sir W. Denison.	TABLE II. exhibits the growth of 11 plants of <i>C. succirubra</i> planted out by his Excellency the Governor, and other gentlemen, at Neddivuttum, on the 30th August 1862. The average growth of these plants during the month is $\frac{2}{11}$ ths of an inch, or $\frac{6}{11}$ ths of an inch under the growth of last month.
2	16 $\frac{1}{2}$	117 $\frac{1}{4}$	118 $\frac{1}{2}$	1 $\frac{1}{2}$		
3	19	119	121	2		
4	15	110 $\frac{1}{2}$	110 $\frac{1}{2}$	—		
5	27	134 $\frac{1}{2}$	135 $\frac{1}{2}$	1 $\frac{1}{2}$	J. W. Breeks, Esq. Dr. Sanderson. J. D. Sim, Esq. Lieutenant McLeod. P. Grant, Esq. Plant cut down for bark.	One of the two plants cut down on the 20th of March 1863 for the bark submitted to Mr. Howard for analysis, has made strong shoots of 82 $\frac{1}{2}$ inches in height, giving the growth of half an inch during the month.
6	20	107 $\frac{1}{2}$	108	1 $\frac{1}{2}$		
7	20	122	123 $\frac{1}{2}$	1 $\frac{1}{2}$		
8	18	124 $\frac{1}{2}$	124 $\frac{3}{4}$	$\frac{1}{4}$		
9	20	129 $\frac{1}{2}$	129 $\frac{3}{4}$	$\frac{1}{4}$		
10	20	130 $\frac{1}{2}$	131	$\frac{1}{2}$		
11	18	112 $\frac{1}{2}$	113 $\frac{1}{2}$	1		
12	—	82	82 $\frac{1}{2}$	$\frac{1}{2}$		

TABLE III.

SHOWING the Height of Twelve Plants of *C. officinalis*, planted on the Dodabetta Plantation at Ootacamund, on the 30th September 1863.

Number of Plants.	Height in Inches when Planted on the 30th September 1863.	Height in Inches on the 31st December 1865.	Height in Inches on the 31st January 1866.	Growth in Inches during January 1866.	REMARKS.
1	19	106 $\frac{1}{2}$	109	2 $\frac{1}{2}$	The 12 plants of <i>C. officinalis</i> (a shrubby species) on the Dodabetta Plantation, gives an average growth of 2 $\frac{3}{4}$ inches, of quarter of an inch under that of last month.
2	14 $\frac{1}{2}$	95	97 $\frac{1}{2}$	2 $\frac{1}{2}$	
3	28	107	110	3	
4	22	103 $\frac{1}{2}$	106 $\frac{1}{2}$	3	
5	21 $\frac{1}{2}$	107	110 $\frac{1}{2}$	3 $\frac{1}{2}$	
6	28	119 $\frac{1}{2}$	121 $\frac{1}{2}$	2	
7	22 $\frac{1}{2}$	101	103 $\frac{1}{2}$	2 $\frac{1}{2}$	
8	21 $\frac{1}{2}$	100 $\frac{1}{2}$	103	2 $\frac{1}{2}$	
9	21 $\frac{1}{2}$	113	116	3	
10	19 $\frac{1}{2}$	104 $\frac{1}{2}$	107 $\frac{1}{2}$	3	
11	24	109 $\frac{1}{2}$	112	2 $\frac{1}{2}$	
12	24	108	111 $\frac{1}{2}$	3 $\frac{1}{2}$	

TABLE IV.

REGISTER of Chinchona Plants Distributed.

NAMES.	STATION.	Number of Plants.	
Mr. F. N. Maltby -	Travancore -	16	The number of plants issued to the public during the month is eight, making the total distributed 83,684.
Dr. Junghuhn -	Java -	56	
Mr. A. R. Lascelles -	Ootacamund -	12	
„ M. Anderson -	Jamaica -	2	
Dr. Wiche -	Bombay -	10	
„ T. Anderson -	Calcutta -	554	
„ Jamieson -	Saharanpore -	107	
Professor Lees -	Calcutta -	547	
Rajah of Travancore -	Travancore -	521	
Major Morgan -	Ootacamund -	1,534	
Mr. E. T. Fitzgerald -	Calcutta -	558	
„ J. W. B. Money -	- ditto -	1,369	
„ W. Bourne -	- ditto -	532	
Captain Cox -	Wynad -	6	
Mr. Hollock -	- ditto -	2	
„ T. Sheffield -	Ootacamund -	12	

TABLE IV.—Register of Chinchona Plants Distributed—*continued*.

NAMES.	STATION.	Number of Plants.	REMARKS.
Dr. F. Day - - - - -	Cochin - - -	100	
Mr. Brown - - - - -	Tellicherry - -	12	
„ J. Hall - - - - -	Ootacamund - -	144	
„ T. Knop - - - - -	- ditto - - -	18	
Captain Lees - - - - -	Bengal - - -	281	
Mr. W. H. Rayne - - - -	Manantoddy - -	424	
Rev. — Sawyer - - - - -	Ootacamund - -	1,018	
Mr. Frend - - - - -	- ditto - - -	512	
„ Hollock - - - - -	- ditto - - -	1	
„ J. Pierie - - - - -	Seegoor - - -	12	
Colonel Scott - - - - -	Ootacamund - -	1,236	
Mr. Berend - - - - -	Cachar - - -	275	
Rev. J. Hunter - - - - -	Coonoor - - -	12	
Mr. J. Mullaly - - - - -	- ditto - - -	24	
„ W. H. Stanes - - - - -	- ditto - - -	1,262	
Colonel R. Cooper - - - -	Kotagherry - -	12	
Mr. F. Cockburn - - - - -	- ditto - - -	12	
Colonel Woodfall - - - -	Coonoor - - -	12	
Mr. C. Anderson - - - - -	- ditto - - -	24	
Colonel Angelo - - - - -	Ootacamund - -	12	
Rev. E. Laseron - - - - -	- ditto - - -	12	
Captain R. N. Taylor - - -	Coorg - - -	96	
Major W. Agnew - - - - -	Assam - - -	139	
Mr. V. H. Levinge - - - -	Madura - - -	12	
Chief Commissioner of - - -	Nagpore - - -	28	
Mr. Fletcher - - - - -	Ootacamund - -	24	
Gool Mahomed - - - - -	- ditto - - -	20	
General McCleverty - - - -	New Zealand - -	23	
Mr. W. Robinson - - - - -	Kotagherry - -	330	
„ Crake - - - - -	Wynad - - -	12	
„ H. R. Dawson - - - - -	Seegoor - - -	12	
Captain Mann - - - - -	Coorg - - -	48	
Mr. E. Roberts - - - - -	- ditto - - -	530	
„ H. Russell - - - - -	Wynad - - -	52	
Rev. — Wait - - - - -	Coonoor - - -	2	
Collector of Belgaum - - - -	Belgaum - - -	28	
Collector of Honore - - - -	Honore - - -	28	
Dr. Ross - - - - -	- ditto - - -	15	
His Excellency the Governor -	Bombay - - -	158	
Mr. H. Hinde - - - - -	Wynad - - -	12	
„ E. B. Thomas - - - - -	Coonoor - - -	74	
Rajah of Poonganoor - - - -	Poonganoor - -	12	
Major Grant - - - - -	Wellington - -	226	
Messrs. Thomson, Shaw & Co. -	Poonganoor - -	28	
Mr. J. H. Trinson - - - - -	- ditto - - -	31	
Dr. Muller - - - - -	Melbourne - -	28	
Mr. Tyrrell - - - - -	Mysore - - -	12	
Dr. Sayers - - - - -	Vellore - - -	12	
Major C. P. Taylor - - - -	Ootacamund - -	5,250	
Dr. Wilson - - - - -	- ditto - - -	6	
Mr. Schnarrie - - - - -	- ditto - - -	15,000	
Captain Fuller - - - - -	Coonoor - - -	417	
Dr. Drummond - - - - -	Ootacamund - -	224	
Captain Jennings - - - - -	- ditto - - -	1,756	
Lieut. H. B. Montmorency - -	Bangalore - -	6	
Mr. McHutchin - - - - -	Ootacamund - -	3	
Colonel Molesworth - - - -	- ditto - - -	6	
Mr. C. Gray - - - - -	Coonoor - - -	12	
„ H. B. Leddell - - - - -	Ootacamund - -	12	
„ Minchin - - - - -	Wynad - - -	1,600	
His Excellency the Governor -	Vizagapatam - -	35	
Mr. R. F. Phillips - - - - -	Kotagherry - -	1,117	
Colonel Cooke - - - - -	- ditto - - -	24	
Mr. G. J. Glasson - - - - -	Wynad - - -	1,000	
Dr. Macpherson - - - - -	Mercara - - -	400	
Mr. W. H. Kerr - - - - -	Coorg - - -	3,100	
„ James - - - - -	Ootacamund - -	1,000	
Colonel Whish - - - - -	Bengal - - -	82	
Mr. K. Mair - - - - -	Calcutta - - -	1,180	
„ W. Shakespear - - - - -	- ditto - - -	61	
„ E. E. Meakin - - - - -	- ditto - - -	168	
„ C. Ackland - - - - -	- ditto - - -	150	
„ K. McIver - - - - -	- ditto - - -	124	

TABLE IV.—Register of Chinchona Plants Distributed—*continued*.

NAMES.	STATION.	Number of Plants.	REMARKS.
Mr. Havelock - - - -	Ootacamund - -	12	
„ H. de Facien - - - -	Kartairy - - -	6,821	
Major Sweet - - - -	- ditto - - -	910	
Captain Campbell - - - -	Bangalore - - -	6	
Royal Gardens - - - -	Mauritius - - -	36	
Hon. W. R. Arbutnot - - - -	Wynad - - -	93	
Mr. H. Maxwell - - - -	Bombay - - -	50	
Mrs. C. Smith - - - -	Wynad - - -	316	
Captain Beckley - - - -	Wellington - - -	200	
Mr. Walsh - - - -	Salem - - -	100	
His Excellency the Governor General	Java - - -	175	
Captain Richardson - - - -	Kulhatty - - -	509	
Rajah of Poongano - - - -	Poonganoor - - -	24	
His Excellency the Governor - - - -	Madras - - -	24	
Mr. J. W. B. Money - - - -	Ootacamund - - -	25,000	
Captain Mitcheson - - - -	- ditto - - -	50	
Mr. R. H. Elliot - - - -	Munjerabad - - -	157	
His Excellency the Governor General	Goa - - -	252	
Colonel Playre - - - -	Rangoon - - -	152	
Mr. Ryall - - - -	Kotagherry - - -	24	
„ J. Gordon - - - -	Coonoor - - -	1,701	
„ J. Rohde - - - -	Neddivattum - - -	100	
„ J. Higginbotham - - - -	Goodaloor - - -	12	
„ S. Pitol - - - -	Mauritius - - -	36	
„ J. Horne - - - -	- ditto - - -	36	
M. Edouard Cremary - - - -	Reunion - - -	51	
For the French Government - - - -	Algiers - - -	45	
Mr. J. B. Norton - - - -	Shevaroy - - -	50	
„ Mackay - - - -	Punjab - - -	50	
„ W. Forsyth - - - -	Central Provinces - - -	169	
Colonel Cadell - - - -	Coorg - - -	62	
Mr. J. L. Browning - - - -	Wynad - - -	4	
„ H. Leeds - - - -	Burmah - - -	112	
Maloo Sait - - - -	- ditto - - -	6	
Mr. A. D. Brown - - - -	Dimhatty - - -	53	
„ J. C. Misquith - - - -	Ootacamund - - -	300	
„ J. L. Transsen - - - -	Coonoor - - -	8	
TOTAL Number of Plants - - -		83,684	

Ootacamund,
19 February 1866.

(signed) W. G. McIvor,
Superintendent, Government Chinchona Plantations.

— No. 76. —

From Messrs. *Thomson, Hankey & Co.*, to the Under Secretary of State for India.

7, Mincing Lane, London,
3 February 1866.

Sir,

WE have been requested by the Executive Committee of the Jamaica Government to procure for them the works on Chinchona cultivation, enumerated at foot. We have applied to Kew Gardens on the subject, and also to the department of the Reporter on the Products of India, Whitehall Yard, but without success. It has, however, been suggested to us, that you may be able to inform us where the pamphlets in question may be obtained, as also copies of works and reports on Chinchona cultivation by Mr. Markham, of the India Office, which, although not mentioned, the Government of Jamaica would no doubt be very glad to obtain.

If you could assist us in obtaining any of these works, we should esteem it a great favour.

We trust that you will excuse our troubling you in this matter.

We are, &c.

To the Under Secretary
of State of India.

(signed) *Thomson, Hankey & Co.*

EXTRACT of Requisition by Jamaica Government.

Notes on the propagation and cultivation of the Medical Chinchonas. Printed and published by order of the Government of Madras, by William Graham McIvor.

Two letters from W. J. McIvor, Esq., to J. D. Quin, Esq., Secretary to Government, Madras.

Any other information on the subject.

— No. 77. —

From Mr. *Deedes* to *Thomson, Hankey & Co.*

Gentlemen,

India Office, 13 February 1866.

IN reply to your letter of the 3d instant, requesting papers for the use of the Executive Committee of the Jamaica Government on the propagation of the Chinchona tree, I am directed to inform you that, in the absence of any date, it is impracticable to trace the letters to which reference is made in your letter. The most recent papers on the subject have already been communicated to the Governor of Jamaica through Her Majesty's Secretary of State for the Colonies, and no duplicate remains in this office.

I am directed to add, that Mr. Markham is at present in India, engaged on a report on the plantations which have been established in that country; when his report has been received, a copy shall be immediately forwarded to your address. In the meantime two reports on the progress of the undertaking, by Mr. McIvor, are forwarded herewith, being the only papers on the subject of general interest since the publication of the Return ordered by the House of Commons to be printed, 20th March 1863, No. 118.

I am, &c.

Messrs. Thomson, Hankey & Co.,
7, Mincing Lane, E.C.

(signed) *Henry Deedes.*

— No. 78. —

From Mr. *Clements Markham* to the Under Secretary of State for India.

21, Eccleston Square, S.W.,

16 April 1866.

Sir,

THE Emperor of Mexico, encouraged by my success in the introduction of Chinchona cultivation into India, is anxious to inaugurate a similar experiment in his own dominions, where Humboldt considered that success would be certain. I received an official letter on the subject from Mexico while at Suez, on my way to India last October, to which I sent a detailed reply.

2. In consequence of my report, His Majesty has commissioned Captain Maury, formerly of the Confederate Navy, and now a Mexican Councillor of State, to apply for Chinchona seeds grown in India, and for full instructions as to the cultivation of the plant. I presume that it will be only necessary to make this application known to the Madras Government, to ensure attention to His Majesty's wishes.

3. Mr. McIvor should be instructed to transmit to me direct, parcels of well-developed seeds of *C. succirubra* and *C. officinalis*, as soon as they are available, and Captain Maury will forward them to Mexico at once, where preparations will have been made for their reception. A copy of Mr. McIvor's most recent manual

Enclosures to
Madras, Mis., Re-
venue Letters, Nos.
16 and 68 of 1865
(Annual Reports,
1863-64, 1864-
65.)

manual of Chinchona cultivation should also be furnished to Captain Maury, in order that it may be translated into Spanish. It has already been translated into Portuguese, at Goa.

4. It is very gratifying to find that the introduction of Chinchona cultivation into India, while conferring an inestimable blessing on our own possessions, will also benefit those Spanish American States whence the plants originally came. The authorities of those States did every thing in their power to thwart my operations; yet within the last two years I have received applications from owners of forest land in New Granada, Ecuador, and Bolivia, for instructions as to our method of cultivating those trees which have hitherto only existed in a wild state in their native habitat; and now it will be to British India, and not to South America, that Mexico will owe the blessings derivable from the cultivation of the fever-dispelling bark.

See my "Travels in Peru and India," p. 338.

I have, &c.

To the Under Secretary
of State for India.

(signed) *Clements R. Markham.*

Enclosure in No. 78.

From Don *Narciso Lorenzano*, an Exporter of Chinchona Bark, to Mr. *Griffith*, Her Majesty's Consul General at Bogota.

My dear Sir,

Bogota, 4 March 1864.

I HAVE to thank you for having sent me a copy of the "Edinburgh Review" of last year, in which I have had the satisfaction of reading the article on the cultivation of quina trees in the East Indies. Permit me to congratulate you on the successful result of this undertaking, which partly ensures the supply of so precious a drug for the future. It appears to me that the principal motive which induced the Government of India to commence this cultivation, after overcoming so many difficulties, was the fear that the quina trees would be extirpated, in consequence of the disorder and waste that is allowed in the woods, where they are destroyed by the barbarous method of pulling up the roots. Fortunately this destructive method, which without any doubt would extirpate this precious plant in a few years, is only practised in the forests of Pitayo, where it is due to the immoderate desire for making money, which has taken possession of the Indians, who own the greater part of the land. But in none of the other establishments for the collection of bark in New Granada has a similar scandal been repeated. On the contrary, beneficial rules are observed for the conservancy of the woods, more especially in those where I have a proprietary interest. The method consists in leaving a part of the trunk, about three feet in height, whence shoots may sprout, and in clearing away the surrounding trees to enable the rays of the sun to penetrate. By this means most of the trees that are cut down quickly shoot up, and, the rays of the sun penetrating to the cleared ground, the seeds which fall from the trees germinate freely. Thus we have the satisfaction of seeing, in the forests worked on this principle, that the trunks of cut trees send out new shoots, and that the young plants grow vigorously. This result gives us full confidence that the good kinds of quinas which exist in this country will be permanently preserved.

To dissipate the apprehension that a day may arrive when humanity will be deprived of this most useful remedy by the destruction of the forests which contain it, I think it will be sufficient to point out our "Andes," which, from the frontier of Brazil and Bolivia to the snowy summits of Cachin and Cocuy, contain the different species of quinas described by the learned Mutis, Caldas, and Humboldt, in abundance. Some of these species do not now find a place in the European markets, because they cannot fetch a remunerative price, owing to their inferior quality, only containing one to two per cent. of alkaloids, quinine, Chinchonidine, Chinchonine, and quinidine. But I hope that in course of time, when the roads of this country are improved, and when the increased demand for this drug has caused its price to rise, then the inferior drugs may be exported, and the vast forests may be worked with advantage to humanity as well as to the speculators. But in spite of the immense deposits of febrifuge barks which Providence has collected in our Cordilleras, I shall always consider the plantations which the foresight of the English Government has established in the East Indies to be of great use, for they will hereafter supply the wants of those countries in which the use of the drug is rapidly extending, as I learn from the same article in the "Edinburgh Review," where the value of the quinine consumed during 1857 and 1858 is given at 54,500*l*.

From the above considerations, we may conclude that there need be no fear that humanity will see itself deprived of this precious medicine, seeing that as well in Bolivia as in Peru, Ecuador, and New Granada, the rule of cutting the bark according to a fixed plan is observed, and care is taken that the woods are replenished with increased numbers of plants of the best species, while some experiments have been made in forming plantations on lands where the best conditions for their growth are found. From all this we hope that in a few years we may see magnificent results.

Hoping that this short account may be of some use, I have the pleasure to repeat that whenever you desire any information respecting the quina trade in this country, I shall be happy to supply it, so far as my limited knowledge will permit. I return you the copy of the "Edinburgh Review," with due thanks, and subscribe myself,

Yours, &c.
(signed) *Narciso Lorenzano.*

— No. 79. —

MEMORANDUM by Mr. *C. R. Markham* on the Preparation of a Monograph on the Chinchona Genus.

THERE is great confusion in the classification of the species of the Chinchona genus, and there is no work of reference on the subject by means of which an inquirer engaged in the cultivation may acquire information which is of great importance to him. The work of Dr. Weddell, though useful so far as the Bolivian species are concerned, is of no value as a guide to any of the other valuable species, and is moreover out of date.

I would venture, therefore, to suggest that the Secretary of State in Council should grant a small sum of money for the preparation of a monograph on the Chinchona genus, in conjunction with the Linnæan Society. It is not unusual to give encouragement of this kind to works connected with India which are solely of a literary or scientific character. A Chinchona monograph would be of great scientific value; and this circumstance recommends my proposal to favourable consideration, and will probably ensure the co-operation of the Linnæan Society. But the chief reason for encouraging and assisting such a publication is, that it will be of the very greatest practical utility to the superintendents of Government plantations, and to private speculators throughout India. There is utter confusion in the classification of many of the species at present. Dr. Anderson, in his last report, quotes high authority for an opinion that two particular species are identical, when in reality they are quite distinct. Similar mistakes of other cultivators have also come to my knowledge. Now, the different species require different treatment under cultivation, so that uncertainty as to their identification will lead to most disastrous results, and an authoritative settlement of all questions connected with them is, therefore, loudly called for. A Chinchona monograph would, it is submitted, under these circumstances, be a work which might properly be assisted by the Secretary of State in Council.

I have consulted Dr. Hooker on the subject, who is of opinion that such a work would be in every way most important, and he has made the following suggestions. The work, he thinks, might be cheaply published in combination with the Linnæan Society. The India Office might pay for the plates (12 to 15 in number), which could be done by Mr. Fitch on stone, in quarto, for 2*l.* apiece, and would take 50 or 100 copies for distribution in India. The Society would do the printing, and publish and distribute the work as a separate part of their transactions, complete *per se*. Dr. Hooker thinks that the expense to the India Office would be covered by a grant of 200*l.*, and that the work might be finished by Christmas. He proposes that Dr. Thomson (late Superintendent of the Botanical Gardens at Calcutta, and joint author, with Dr. Hooker, of the "Flora Indica") should be employed to prepare the work, and that he should be restricted as to time of producing it. If this proposal should be approved, I would open communications on the subject with Dr. Hooker, Dr. Thomson, and Mr. Bentham, the President of the Linnæan Society.

(signed) *Clements R. Markham.*

25 April 1865.

— No. 80. —

From the Superintendent, Government Botanical Gardens, and Chinchona Plantations, to the Acting Secretary to Government Revenue Department, Madras.

16 November 1865.

1. I HAVE the honour to forward the budget estimates of this department for the official year 1866-67, which I trust will receive the approval of Government. This estimate provides for 150 acres additional land being brought into cultivation; yet, notwithstanding the estimated expenditure of 1866-67 is upwards of 14,000 rupees less than 1865-66. This decrease is principally owing to the early planted portions of the plantations being now so well established as to require little labour in maintaining them.

2. The term of engagement of the deputy superintendent, Mr. Batcock, expires on the 14th of October 1866, and I have entered in the budget estimate an increase to his salary of Rs. 41. 10. 8., which will make his total pay 200 rupees per mensem, from the 14th October 1866, to the 30th April 1867, and trust that this arrangement will meet with the approval of Government.

3. With the sanction of Government, I would also most respectfully propose to place the Neddivuttum and Pycara Plantations under one assistant superintendent, on a salary of 150 rupees per mensem, or an increase of 25 rupees. This will effect a saving in the establishment, while one superintendent will be able to perform the whole work, now that a road is open connecting the two plantations.

4. In consequence of the high rates of provisions on the hills, I have also proposed, for the sanction of Government, an increase of 10 rupees per mensem to the salaries of the office manager and pay clerk.

ORDER of the Madras Government, 5 January 1866.

1. With his letter above recorded, the superintendent of the Government Chinchona Plantations submits his budget of receipts and charges for 1866-67.

2. Mr. McIvor's estimate of receipts amounts to 19,300 rupees, against 11,200 rupees, the actual collections of 1864-65, and 20,000 rupees, the budget estimate for 1865-66. The price of Chinchona plants having been lately reduced, the estimate will be fixed in round numbers at 20,000 rupees. Mr. McIvor's return, it is observed, has not been correctly framed. The accountant-general will furnish him with the necessary instructions.

3. The budget of charges amounts to 84,778 rupees, and is less than the estimate (90,467 rupees) for 1865-66 by 14,689 rupees, notwithstanding (as Mr. McIvor states) the provision made for the addition of 150 acres to the ground already under cultivation. Mr. McIvor attributes this decrease principally "to the early planted portions of the plantations being now so well established as to require little labour in maintaining them;" but the decrease, the Government observe, is chiefly on account of buildings, and in the working charges" there is an increase of 1,400 rupees. The estimate provides for planting 150 acres during 1866-67. Mr. McIvor will report the area which he proposes to plant in each estate during the year.

	Decrease.
Construction and repair of buildings - - -	Rs. 10,560
Orchid and Fern House - -	2,600
Fountain - - -	1,500
Tea Plantations - - -	1,844
Rs.	16,444

4. Mr. McIvor proposes increases of salary to the persons named in the margin. Such propositions must be submitted separately and distinctly from the budget, with all necessary particulars. The excess of 720 rupees will therefore be struck out and Mr. McIvor will be instructed to submit these proposals separately; there will be no difficulty in providing the small sum requisite from savings.

	Increase.
Mr. Batcock - - -	R. a. p. 41 10 8
Assistant Superintendent of Neddivuttum and Pycara Plantations - - -	25 - -
Office Manager - - -	10 - -
Pay Clerk - - -	10 - -

5. The sum of 7,500 rupees entered for construction and repair of buildings is passed. Mr. McIvor will submit plans and estimates for any new buildings and additions, to present buildings which may be required. "Peons', gardeners',

and servants' clothing," is a new item, but considering the nature of the climate of the hills and the usage in other departments, it is passed.

The sums authorised for 1865-66, and those now passed for 1866-67, are given below:—

	1865-66.	1866-67.
	<i>Rs.</i>	<i>Rs.</i>
CHINCHONA PLANTATIONS:		
Salaries - - - - -	12,400	10,900
Establishments - - - - -	34,500	34,450
Contingencies - - - - -	3,500	4,000
Working Charges - - - - -	21,600	23,000
Buildings - - - - -	18,000	7,500
Travelling Allowance to Superintendent -	1,100	1,100
Clothing - - - - -	-	550
TOTAL - - - - -	91,100	81,500
BOTANICAL AND HORTICULTURAL GARDENS:		
Annual Allowance - - - - -	1,200	1,200
Erection of Orchid and Fern Houses - -	4,100	-
TOTAL - - - - -	5,300	1,200
Tea Plantation - - - - -	3,200	1,400
GRAND TOTAL - - - -	99,600	84,100

7. With these remarks the budget will be transmitted to the Accountant-General.

— No. 81. —

From the Government of Madras to the Secretary of State for India.

Madras, 13 April 1866.

WE have the honour to forward, for your information, the accompanying Tabular Report on the number, condition, &c., of the Chinchona plants on the Neilgherries, on the 28th of February 1866.

Enclosure in No. 81.

REPORT on the Number, Distribution, and Condition of Chinchona Plants on the Neilgherries, on the 28th February 1866.

	Botanical Names.	Commercial Names.	Number of Plants.	Value per Lb. of Dry Bark in the London Market.	REMARKS.
1	<i>C. succirubra</i> - -	Red Bark - -	290,655	<i>s. d.</i> 2 16 to 8 9	The number of plants planted out in the plantations remain the same as in last month, namely, 244,871.
2	<i>C. Calisaya</i> , var. <i>Frutex</i> , var. <i>Vera</i> .	Yellow Bark - -	18,151	2 10 to 7 -	
3	<i>C. officinalis</i> , var. <i>Condaminea</i> (<i>C. Uritusinga</i>).	Original Loxa Bark	8,219	2 10 to 7 -	
4	<i>C. officinalis</i> , var. <i>Bonplandiana</i> (<i>C. Chahuarguera</i>).	Select Crown Bark -	675,028	2 10 to 7 -	The increase by propagation is 42,903, being 9,652 under the average of the last six months, making the total number of plants 1,026,796.
5	<i>C. crespilla</i> - -	Fine Crown Bark -	4,380	2 10 to 6 -	
6	<i>C. lancifolia</i> - -	Pitayo Bark - -	198	1 8 to 2 10	
7	<i>C. nitida</i> - -	Genuine Grey Bark	2,786	1 8 to 2 9	Unknown.
8	<i>C. species</i> without name.	Fine Grey Bark -	8,500	1 8 to 2 10	
9	<i>C. micrantha</i> - -	Grey Bark - -	15,065	1 8 to 2 9	
10	<i>C. Peruviana</i> - -	Finest Grey Bark -	3,389	1 8 to 2 10	
11	<i>C. Pahudiana</i> - -	Unknown - -	425	Unknown.	
TOTAL Number of Plants - - -			1,026,796		

TABLE II.

MEMORANDUM of the Growth of Eleven Plants of *C. succirubra*, planted on the Second Denison Plantation, at Neddivuttum, on 30 August 1862.

Number of Plants.	Height in Inches when Planted on 30 August 1862.	Height in Inches on 31 January 1866.	Height in Inches on 28 February 1866.	Growth in Inches during February 1866.	By whom Planted.
1	23	131 $\frac{3}{4}$	132 $\frac{1}{4}$	0 $\frac{1}{2}$	His Excellency Sir W. Denison.
2	16 $\frac{1}{2}$	118 $\frac{1}{2}$	119 $\frac{1}{2}$	1	
3	19	121	122 $\frac{1}{2}$	1 $\frac{1}{2}$	
4	15	110 $\frac{1}{2}$	111 $\frac{1}{4}$	0 $\frac{3}{4}$	
5	27	135 $\frac{1}{2}$	136 $\frac{1}{2}$	1	
6	20	108	109	1	J. W. Brecks, Esq.
7	20	123 $\frac{1}{4}$	124 $\frac{1}{4}$	1	Dr. Sanderson.
8	18	124 $\frac{3}{4}$	125 $\frac{1}{2}$	0 $\frac{3}{4}$	J. D. Sim, Esq.
9	20	129 $\frac{3}{4}$	130 $\frac{3}{4}$	1	Lieutenant McLeod.
10	20	131	131 $\frac{1}{2}$	0 $\frac{1}{2}$	P. Grant, Esq.
11	18	113 $\frac{1}{2}$	114 $\frac{1}{2}$	1	Plant cut down for bark.
12	-	82 $\frac{1}{2}$	83	0 $\frac{1}{2}$	

TABLE II. exhibits the growth of 11 plants of *C. succirubra*, planted out by his Excellency the Governor, and other gentlemen, at Neddivuttum on the 30th August 1862. The average growth of these plants during the month, is $\frac{10}{11}$ of an inch, or $\frac{4}{11}$ of an inch above the growth of last month.

One of the two plants cut down on the 20th of March 1863, for the bark submitted to Mr. Howard for analysis, has made strong shoots of 83 inches in height, giving the growth of $\frac{1}{2}$ an inch during the month.

TABLE III.

SHOWING the Height of Twelve Plants of *C. officinalis*, planted on the Dodabetta Plantation at Ootacamund, on the 30th September 1863.

Number of Plants.	Height in Inches when Planted on 30 September 1863.	Height in Inches on 31 January 1866.	Height in Inches on 28 February 1866.	Growth in Inches during February 1866.	REMARKS.
1	19	109	110 $\frac{1}{2}$	1 $\frac{1}{2}$	The twelve plants of <i>C. officinalis</i> (a shrubby species) on the Dodabetta Plantation gives an average growth of 2 $\frac{1}{2}$ inches, or $\frac{2}{3}$ of an inch, under that of last month.
2	14 $\frac{1}{2}$	97 $\frac{1}{2}$	98	0 $\frac{1}{2}$	
3	28	110	111 $\frac{1}{2}$	1 $\frac{1}{2}$	
4	22	106 $\frac{1}{2}$	108	1 $\frac{1}{2}$	
5	21 $\frac{1}{2}$	110 $\frac{1}{2}$	113 $\frac{1}{2}$	3	
6	28	121 $\frac{1}{2}$	124	2 $\frac{1}{2}$	
7	22 $\frac{1}{2}$	103 $\frac{1}{2}$	106	2 $\frac{1}{2}$	
8	21 $\frac{1}{2}$	103	106 $\frac{1}{2}$	3	
9	21 $\frac{1}{2}$	116	118 $\frac{1}{2}$	2 $\frac{1}{2}$	
10	19 $\frac{1}{2}$	107 $\frac{1}{2}$	109 $\frac{1}{2}$	2	
11	24	112	114 $\frac{1}{2}$	2 $\frac{1}{2}$	
12	24	111 $\frac{1}{2}$	113 $\frac{1}{2}$	2	

TABLE IV.

REGISTER of Chinchona Plants Distributed.

NAMES.	STATION.	Number of Plants.
Mr. F. N. Maltby - . - .	Travancore - - -	16
Dr. Junghuhn - - - -	Java - - - -	56
Mr. A. R. Lascelles - - -	Ootacamund - - -	12
Mr. M. Anderson - - - -	Jamaica - - - -	2
Dr. Wiche - - - - -	Bombay - - - -	10
Dr. T. Anderson - - - -	Calcutta - - - -	554
Dr. Jamieson - - - - -	Saharanpore - - -	107
Professor Lees - - - -	Calcutta - - - -	547
Rajah of Travancore - - -	Travancore - - -	521
Major Morgan - - - - -	Ootacamund - - -	1,534
Mr. E. T. Fitzgerald - - -	Calcutta - - - -	558
Mr. J. W. B. Money - - -	- ditto - - - -	1,369
Mr. W. Bourne - - - - -	- ditto - - - -	532
Captain Cox - - - - -	Wynad - - - -	6
Mr. Hollock - - - - -	- ditto - - - -	2
Mr. T. Sheffield - - - -	Ootacamund - - -	12
Dr. F. Day - - - - -	Cochin - - - -	100
Mr. Brown - - - - -	Tellicherry - - -	12
Mr. J. Hall - - - - -	Ootacamund - - -	144
Mr. T. Knop - - - - -	- ditto - - - -	18
Captain Lees - - - - -	Bengal - - - -	281
Mr. W. H. Rayne - - - -	Manantoddy - - -	424
Reverend — Sawyer - - -	Ootacamund - - -	1,018
Mr. Frend - - - - -	- ditto - - - -	512
Mr. Hollock - - - - -	- ditto - - - -	1
Mr. J. Pierie - - - - -	Seegoor - - - -	12
Colonel Scott - - - - -	Ootacamund - - -	1,236
Mr. Berend - - - - -	Cachar - - - -	275
Rev. J. Hunter - - - - -	Coonoor - - - -	12
Mr. J. Mullaly - - - -	- ditto - - - -	24
Mr. W. H. Stanes - - - -	- ditto - - - -	1,262
Colonel R. Cooper - - - -	Kotagherry - - -	12
Mr. F. Cockburn - - - -	- ditto - - - -	12
Colonel Woodfall - - - -	Coonoor - - - -	12

The number of plants issued to the public during the month is 250, making the total distributed 83,934.

TABLE IV.—REGISTER of Chinchona Plants Distributed—*continued*.

NAMES.	STATION.	Number of Plants.	REMARKS.
Mr. C. Anderson - - -	Coonoor - - -	24	
Colonel Angelo - - -	Ootacamund - - -	12	
Rev. E. Laseron - - -	- ditto - - -	12	
Captain R. N. Taylor - - -	Coorg - - -	96	
Major W. Agnew - - -	Assam - - -	139	
Mr. V. H. Levinge - - -	Madura - - -	12	
Chief Commissioner of - - -	Nagpore - - -	28	
Mr. Fletcher - - -	Ootacamund - - -	24	
Gool Mahomed - - -	- ditto - - -	20	
General McCleverty - - -	New Zealand - - -	23	
Mr. W. Robinson - - -	Kotagherry - - -	330	
Mr. Crake - - -	Wynad - - -	12	
Mr. H. R. Dawson - - -	Seegoor - - -	12	
Captain Mann - - -	Coorg - - -	48	
Mr. E. Roberts - - -	- ditto - - -	530	
Mr. H. Russell - - -	Wynad - - -	52	
Rev. -- Wait - - -	Coonoor - - -	2	
Collector of Belgaum - - -	Belgaum - - -	28	
Collector of Honore - - -	Honore - - -	28	
Dr. Ross - - -	- ditto - - -	15	
His Excellency the Governor - - -	Bombay - - -	158	
Mr. H. Hinde - - -	Wynad - - -	12	
Mr. E. B. Thomas - - -	Coonoor - - -	74	
Rajah of Poonganoor - - -	Poonganoor - - -	12	
Major Grant - - -	Wellington - - -	226	
Messrs. Thomson, Shaw & Co. - - -	Poonganoor - - -	28	
Mr. J. H. Trinson - - -	- ditto - - -	31	
Dr. Muller - - -	Melbourne - - -	28	
Mr. Tyrrell - - -	Mysore - - -	12	
Dr. Sayers - - -	Vellore - - -	12	
Major C. P. Taylor - - -	Ootacamund - - -	5,250	
Dr. Wilson - - -	- ditto - - -	6	
Mr. Schnarrie - - -	- ditto - - -	15,000	
Captain Fuller - - -	Coonoor - - -	417	
Dr. Drummond - - -	Ootacamund - - -	224	
Captain Jennings - - -	- ditto - - -	1,756	
Lieut. H. B. Montmorency - - -	Bangalore - - -	6	
Mr. McHutchin - - -	Ootacamund - - -	3	
Colonel Molesworth - - -	- ditto - - -	6	
Mr. C. Gray - - -	Coonoor - - -	12	
Mr. H. B. Leddell - - -	Ootacamund - - -	12	
Mr. Minchin - - -	Wynad - - -	1,600	
His Excellency the Governor - - -	Vizagapatam - - -	35	
Mr. R. F. Phillips - - -	Kotagherry - - -	1,117	
Colonel Cooke - - -	- ditto - - -	24	
Mr. G. J. Glasson - - -	Wynad - - -	1,000	
Dr. Macpherson - - -	Mercara - - -	400	
Mr. W. H. Kerr - - -	Coorg - - -	3,100	
Mr. James - - -	Ootacamund - - -	1,000	
Colonel Whish - - -	Bengal - - -	82	
Mr. K. Mair - - -	Calcutta - - -	1,180	
Mr. W. Shakespear - - -	- ditto - - -	61	
Mr. E. E. Meakin - - -	- ditto - - -	168	
Mr. C. Ackland - - -	- ditto - - -	150	
Mr. K. McIver - - -	- ditto - - -	124	
Mr. Havelock - - -	Ootacamund - - -	12	
Mr. H. de Facien - - -	Kartairy - - -	6,821	
Major Sweet - - -	- ditto - - -	910	
Captain Campbell - - -	Bangalore - - -	6	
Royal Gardens - - -	Mauritius - - -	36	
Hon. W. R. Arbuthnot - - -	Wynad - - -	93	
Mr. H. Maxwell - - -	Bombay - - -	50	
Mrs. C. Smith - - -	Wynad - - -	316	
Captain Beckley - - -	Wellington - - -	200	
Mr. Walsh - - -	Salem - - -	100	
His Excellency the Governor General - - -	Java - - -	175	
Captain Richardson - - -	Kulhatty - - -	509	

TABLE IV.—REGISTER of Chinchona Plants Distributed—*continued*.

NAMES.	STATION.	Number of Plants.	REMARKS.
Rajah of Poonganoor - - -	Poonganoor - - -	24	
His Excellency the Governor - - -	Madras - - -	24	
Mr. J. W. B. Money - - -	Ootacamund - - -	25,000	
Captain Mitcheson - - -	- ditto - - -	50	
Mr. R. H. Elliot - - -	Munjerabad - - -	157	
His Excellency the Governor General - - -	Goa - - -	252	
Colonel Phayre - - -	Rangoon - - -	152	
Mr. Ryall - - -	Kotagherry - - -	24	
Mr. J. Gordon - - -	Coonoor - - -	1,701	
Mr. J. Rohde - - -	Neddivuttum - - -	100	
Mr. J. Higginbotham - - -	Goodaloor - - -	12	
Mr. S. Pitol - - -	Mauritius - - -	36	
Mr. J. Horne - - -	- ditto - - -	36	
M. Edouard Cremary - - -	Reunion - - -	51	
For the French Government - - -	Algiers - - -	45	
Mr. J. B. Norton - - -	Shevaroy's - - -	50	
Mr. Mackay - - -	Punjab - - -	50	
Mr. W. Forsyth - - -	Central Provinces - - -	169	
Colonel Cadell - - -	Coorg - - -	62	
Mr. J. L. Browning - - -	Wynad - - -	4	
Mr. H. Leeds - - -	Burmah - - -	112	
Maloo Sait - - -	- ditto - - -	6	
Mr. A. D. Brown - - -	Dimhatty - - -	53	
Mr. J. C. Misquith - - -	Ootacamund - - -	300	
Mr. J. L. Transsen - - -	Coonoor - - -	8	
Captain Fitzgerald - - -	Calcutta - - -	150	
Mr. J. Mullaly - - -	Coonoor - - -	100	
TOTAL Number of Plants - - -		83,934	

Ootacamund,
March 1865.

(signed) W. G. McIvor,
Superintendent, Government Chinchona Plantations.

— No. 82. —

From the Government of Madras to the Secretary of State for India.

Madras, 11 April 1866.

1. IN continuation of our Despatch, 25th December 1865, we have the honour to forward the accompanying further papers relative to Mr. McIvor's application for a patent for his discovery of the utility of moss in increasing the deposition of quinine in the bark of the Chinchona.

2. You will observe that we have recommended to the Government of India that the grant of the patent should be withheld, for the reasons mentioned in the Minutes recorded in our Proceedings of 14th March.

Enclosures in No. 82.

From the Officiating Under Secretary to the Government of India, Home Department, to the Secretary to the Government of Fort Saint George.

Fort William, 25 January 1866.

WITH reference to your letter, No. 3,084, dated 21st ultimo, drawing the attention of the Governor General in Council to the fact that Mr. McIvor "has applied for a patent for his discovery of the utility of moss in increasing the deposition of Quinine in the bark of Chinchona," I am directed to inquire whether it is to be understood from your communication that the Madras Government considers it objectionable on the part of Mr. McIvor, as a servant of Government, to have applied for the patent in question; or, whether it is intended to indicate a doubt as regards Mr. McIvor's, or any person's right to obtain an exclusive privilege in respect of such a matter; or, lastly, granting the legal right to obtain an exclusive privilege, whether the Madras Government consider it should be, in this case, disallowed, as being generally prejudicial to the public,—(See Section 16 of Act XV. of 1859.)

MINUTE by the Honourable *T. Pycroft*.

1. In the above letter the Government of India, in reply to our letter of 21st December last, drawing attention to an application made to them by Mr. McIvor, Superintendent Government Chinchona Plantations on the Neilgherry Hills, for a patent for his discovery of the utility of moss in increasing the deposition of Quinine in the bark of Chinchona, inquire—

First. Whether it is considered objectionable on the part of Mr. McIvor, as a servant of Government, to have applied for the patent in question?

Secondly. Whether it is considered doubtful as regards Mr. McIvor, or any person, that he should have a right to obtain an exclusive privilege in respect of such a matter? and,

Thirdly. Granting a legal right to obtain an exclusive privilege, whether the Madras Government consider that it should be in this case disallowed, as being generally prejudicial to the public?—Act XV. 1859, Section 16.

2. It seems to me that all these three questions should be answered in the affirmative.

3. As to the first, Mr. McIvor is the Superintendent of the Government Chinchona Plantations on the Neilgherries, on the liberal salary of 500 rupees per mensem. As such he has not had to carry out the cultivation of a particular plant according to a system already established. He has had to undertake the cultivation of the Chinchona from its first introduction from South America, and to ascertain, by varied and repeated trials, the soil, climate, temperature and exposure best suited to the plant, and the processes by which its alkaloids may most be developed. His proceedings have throughout been essentially tentative and experimental; and it seems to me out of all reason that he should be allowed to avail himself of his position, and the means placed by Government at his disposal for the conduct of his experiments, in land, Chinchona plants, establishment, and money to make discoveries, to be turned against the Government which employs him and affords him these facilities, and to be enjoyed by them only on such terms as he may think proper to demand.

4. If this be permitted in respect to this particular alleged invention of the mossing of the Chinchona plant, where is it to end as regards Mr. McIvor himself and others?

5. Mr. McIvor may patent every process connected with the cultivation of the Chinchona plant which he may discover, from the potting of the seedling until it becomes a forest tree, or connected with the extraction and development, &c., of its alkaloids.

6. What he does, others in like circumstances may do. Mr. Markham has lately recommended that a Quinologist of established reputation may be procured by this Government from England, for the purpose of investigating on the spot the cheapest and most effectual method of extracting the febrifuge alkaloids from the Chinchona bark. The suggestion seems to me a good one, but if Mr. McIvor's case is to form a precedent, the gentleman who may be sent out, unless he be restrained by express stipulations in his covenant, may make every process that he may invent by the use of the bark and chemical apparatus furnished him by Government, the subject of a special patent for his own advantage.

7. This Government have recently sent some Chinchona bark obtained from England to the Government Chemical Examiner, Dr. Wyndowe, and have instructed him, not as his special and peculiar province, but as an adjunct to his ordinary duty, to analyze it and some fresh bark procured from Ootacamund, and report the results. If in the course of his experiments Dr. Wyndowe should hit upon any superior and apparently novel method of extracting quinine or its kindred alkaloids, is he to be at liberty to patent it under Act XX., 1859?

8. Major Morgan, Deputy Conservator of Forests, I observe from the Gazette of India, 6th January 1866, has obtained a patent for a peat cup for the transplantation of the Chinchona plant. Major Morgan's position differs from that of Mr. McIvor, inasmuch as the former, although in the Forest Department, has no special connection with Chinchona cultivation, and made the invention, if it be one, in his own private plantation. This Government, however, was not aware of the patent having been given or applied for until they saw the notice of the filing of the specification in the Gazette, and consequently could not object to it.

9. In the reply to an inquiry whether a cotton press, designed by Dr. Forbes of Bombay, had been patented, this Government were informed (letter from officer in charge of the office of Cotton Commissioner, Dharwar, 29th January 1866) that it had not, as it "had been designed by Dr. Forbes when employed in an official capacity."

10. The second query asked by the Government of India, viz., as to Mr. McIvor's or any other person's right to obtain an exclusive privilege in respect of such a matter as mossing the bark of Chinchona trees, involves perhaps rather a question of law than one for the opinion of this Government. I may, however, remark that large as are the definitions of the terms "invention" and "manufacture" in the interpretation Clause (38) of Act XV. (1859), it seems to me doubtful whether they can apply to so simple a process as wrapping moss or any other natural non-conducting substance round the stem of a tree.

11. Again the process was communicated by Mr. McIvor to Government in view to its being made public use of, or with the knowledge that it would be made of public use, before Mr. McIvor submitted any petition to the Government of India under Act XV, 1859, Section 1), for leave to file his specification.

12. In Mr. McIvor's letter to Government, 3rd May 1865, I find reference made as per margin, to the application of damp moss to Chinchona stems, from which strips of the bark had been removed. The letter was accompanied by specimens of bark, some of which had, and some had not, been thickened by the application of moss.

13. This letter was sent with the bark to the Secretary of State.

14. In his annual report, dated 16th August 1865, on the Government Chinchona plantations for 1864-65, McIvor (paragraphs 29 and 30) described the method which he had adopted for mossing the stems of Chinchona plants, from which strips of bark had been removed, and gave an illustration of the method of removing the bark and applying the moss. He stated (paragraph 30) that the application of moss had also the advantage of greatly increasing the weight and thickness of the bark, and, as the observations which had been made seem to indicate, of increasing the alkaloids.

15. Mr. McIvor's annual reports, or such parts of them as relate to changes in the management of the plant, are all printed uniformly as manuals for planters. In the present instance, Mr. McIvor in his letter (18th August 1865) forwarding his annual report, requested that he might be supplied with 300 copies of paragraphs 2 to 13 and 19 to 35 inclusive (which included those, 29, 30, relative to the mossing) for distribution to planters.

16. In a subsequent letter, 25th September 1865, Mr. McIvor requested that those two paragraphs (29, 30) of his report might be withdrawn, "as the views set out in them now appeared immature, and to require further consideration and more experience, prior to their being laid before the public." I shall show immediately that some days before this last letter was written, Mr. McIvor had applied to the Supreme Government for his patent.

17. Mr. McIvor's report, including these two paragraphs, 29 and 30, and this subsequent letter, was laid on the editor's table on the 1st November 1865.

18. Nothing further was heard from Mr. McIvor on the subject, until, on the 24th November 1865, he reported that the experiment of mossing trees had proved successful, and that "in order to procure to himself participation in the benefit of results so important, he had considered it desirable to secure the discovery by patent rights under Act XV, 1859."

Telegram from
Home Secretary to
Government of
India, 28 February
1866.

19. I find, on reference to the Government of India, that Mr. McIvor's application to them for the patent was made on the 16th September 1865, more than two months before the above intimation, and nine days before he wrote his letter (25th September) to this Government, in which he requested that that part of his annual report which related to the mossing of Chinchona trees might be withdrawn, "as his views appeared immature, and requiring further consideration and more experience, prior to their being laid before the public!"

20. It seems to me very questionable whether a process carried on in Government gardens, at Government expense, and by their own servant, described by him in ordinary course in his occasional and yearly reports of operations, which reports were meant to be laid, and which were laid by Government before the public, can form a proper subject of patent rights as against either Government or the public.

21. As respects the third inquiry made by the Government of India, or whether the exclusive privilege sought by Mr. McIvor should be disallowed under Section 16, Act XV, 1859, as being generally prejudicial to the public, I would remark that if Mr. McIvor obtains the patent he can of course charge for the use of it in any royalty that he may see fit to demand. Supposing that, as has been proposed, 1,200 acres of Chinchona plantation be laid out by Government, and that they contain on the average 400 trees to the acre, or 480,000 trees, this at only one anna a tree, would involve a payment from Government to Mr. McIvor of 30,000 rupees per annum for the next 14 years. As, however, Mr. McIvor estimates the present net value of an acre of Chinchona at 700 rupees yearly, and reckons that mossing the bark will increase the yield thirty-fold, it is not to be supposed that he will limit himself to so small a charge as one anna per tree, and even if he does, we can have no security that his heirs, executors, and assigns will imitate his moderation.

22. The Secretary of State has, in a recent despatch, stated that his object in introducing Chinchona cultivation into India was to reduce the price of its bark as much as possible, and to bring its extracts within the means of the poorest of the population. This benevolent object will hardly be effected, if the officer in charge of the Government plantations is to patent for his own behoof all the important processes that he may devise for the rearing of the plant and development of its alkaloids.

23. My own view, I confess, is, that the Chinchona experiments have now reached that stage, in which Government may, with propriety, withdraw gradually from the undertaking, and leave it to be followed out by private enterprise. Under any circumstances, however, the private cultivator, and the public for whom both he and the Government are working, will have good reason to complain if the production of the alkaloids be made more costly on account of patent rights conferred on Government servants in special charge of their Chinchona plantations.

24. By section 2, Act XV., 1859, the Governor General in Council may make an order to authorise the filing of a specification of an invention, but he is not obliged to grant such authority. It seems to me that in the present instance such authority should not be given, looking to Mr. McIvor's official position, to the nature of the so-called invention, and to the injury to the public, which might result from its being patented. At any rate, seeing the importance attached by the Home Government to the plentiful and cheap supply of quinine for

for use in India, I think that before any patent be granted to Mr. McIvor, the question should be referred for the orders of the Secretary of State.

25. In what I have written above it is not my intention in any way to detract from Mr. McIvor's merits in connection with the Government Chinchona Gardens. Whether or not the rearing of the Chinchona plant on the Neilgherries was a matter of so much difficulty as some have supposed, and whether or not others might not have had as much success as Mr. McIvor, there can be no doubt that he has done his work zealously and well. If the remuneration which he has hitherto received be incommensurate with his services—not that it seems to me so to be—let it be enhanced by means of a special donation, increased salary, or pension on retirement, but let not the cultivation of Chinchona generally be hampered and impeded by the conferring on him of patent rights.

3rd March 1866.

(signed) *T. Pycroft.*

MINUTE by the Honourable *H. D. Phillips.*

1. It is a difficult question rather, whether Mr. McIvor, adverting to the position he has held in the Government Chinchona Plantation, can legally turn to his own special and sole advantage, an improvement, termed by him a discovery, which he is acknowledged to have made with material belonging to his employers, whilst receiving their daily wage. But it is purely a law question, which, at the present time, this Government need not be at the pains of endeavouring to determine.

2. I would, however, meanwhile suggest to the Supreme Government, that they withhold the patent applied for by Mr. McIvor, and applied for, as it seems to me, in a manner which, on reference to the dates and tenor of his letters to this Government, must be regarded as somewhat disingenuous.

3. The reasons which I would adduce for refusing to issue the patent, are clearly and forcibly stated in Mr. Pycroft's Minute. But apart from these, I am quite of opinion with his Excellency the President, that Act XV. of 1859 cannot properly be used for covering and protecting the improvement claimed by Mr. McIvor as his discovery, and if the Act left the grant of a patent to the discretion of this Government, I should not hesitate in refusing to give Mr. McIvor what he wants.

4. Should the pension to which, as an uncovenanted servant, Mr. McIvor will hereafter be entitled, seem to the Secretary of State an insufficient recognition of Mr. McIvor's services, it will be a proper and graceful acknowledgment of his labours to make to him some special donation. But it ought, I think, to be previously determined beyond all doubt, that under the moss-covering system of cultivation, future and successive supplies of bark from the Neilgherry trees will not fail to yield an uninterrupted supply of that unusually large quantity of alkaloids which has been secured by the analysis of the single supply sent to England.

5th March 1866.

(signed) *H. D. Phillips.*

MINUTE by the Honourable the President.

1. I do not think that the so-called "discovery" can be the subject of a patent, first, because such a process has been constantly used by gardeners, though not for the special purpose contemplated by Mr. McIvor; and second, because the process was made public with special reference to this purpose by the Government. I do not think that the fact of Mr. McIvor having obtained the information necessary to enable him to claim a patent right while in the service of Government can disentitle him to the advantage. Nearly every patent for mechanical applications and improvements is taken out by men who have been employed in working machinery for others, and who have procured the knowledge necessary to the invention at the expense of, or rather while working for the benefit of others.

2. I think the Government of India would act wisely in refusing to patent this so-called discovery, but they would also best act justly and fairly to Mr. McIvor were they to make him an acknowledgment should the discovery prove to be valuable, proportionate to the benefit derived from the process, for I hold that the Government, in employing Mr. McIvor, only looked to his experience as a cultivator, and did not have him as an experimentalist generally upon the production of alkaloids.

8 March 1866.

(signed) *W. T. Denison.*

From the Secretary to the Madras Government to the Secretary to the Government of India.

Sir,

Fort St. George, 14 March 1866.

I AM directed to acknowledge your Under Secretary's letter, of 25th January 1866, and to recommend that the grant of the patent applied for by Mr. McIvor should be withheld for the reasons mentioned in the enclosed minutes of the members of this Government.

I have, &c.
(signed) *J. D. Sim,*
Secretary to Government.

— No. 83. —

From the Secretary of State for India to the Government of Madras.

India Office, 16 June 1866.

I HAVE considered, in Council, the letters in the Revenue Department, dated 25th December 1865, and 11th April 1866, forwarding correspondence relative to the invention by Mr. McIvor of a new mode of promoting the deposition of quinine and the other more valuable alkaloids in the bark of the chinchona, by the application of moss to the tree, and to the question of complying with the request submitted to the Government of India by Mr. McIvor, for a patent for his discovery.

2. It has always been laid down that the Government is entitled to the entire results of the labours of its officers in India, obtained in the discharge of their official duties; and, on this principle, the application of Mr. McIvor for a patent for his invention would be inadmissible.

3. The other reasons stated in the minute of Mr. Pycroft, and concurred in by the late Governor and by Mr. Phillips, are, in my opinion, equally conclusive against the grant of the exclusive privileges applied for by Mr. McIvor; and, as the operation of a patent in this case would tend most materially to restrict the benefits which the introduction of the chinchona into India are intended to produce, I entirely approve your recommendation to the Government of India, that the application of Mr. McIvor should not be complied with.

— No. 84. —

From the Government of Madras to the Secretary of State for India.

Madras, 13 March 1866.

1. WE have the honour, with reference to your Despatch dated 30th September last (Public, No. 27), to inform you that we have called on the Principal Inspector General of the Medical Department to submit a list of the medical officers whom, having regard to the qualifications you name, he would recommend us to appoint to the proposed Commission, and also to make such suggestions, as occur to him, for ensuring a decisive trial of the relative and positive qualities, as febrifuges, of the various chinchona alkaloids and preparations which, it is hoped, may prove nearly, if not quite, as efficacious as quinine.

2. We have not yet received the promised supplies of these alkaloids, and would be glad to know when they are likely to reach us. You will observe by our Proceedings of the 20th and 24th ultimo, that we have instructed our chemical examiner, Dr. Wyndowe, to analyse some specimens of bark procured from England by our president, as well as specimens furnished by Mr. McIvor.

Proceedings of Government, 20 Feb. 1866, Nos. 338, 389.	Mr. Clements Markham, detailing the results
Ditto - - - 24 Feb. " " 485, 486.	of his inspection of the different chinchona
Ditto - - - 12 Mar. " " 175-184.	plantations on the Neilgherries, and his visit

to the Wynaad Talook, the Pulneys, &c., and setting forth the various measures which he considers it desirable for us to adopt.

4. You will, we feel sure, be gratified to find how fully Mr. Markham bears out the very favourable reports we have periodically sent you of the progress of our plantations, and of the zealous and able exertions of our superintendent, Mr. McIvor.

5. We shall now notice and state our views on Mr. Markham's suggestions:—

I. The appointment of a quinologist of established reputation, to be stationed at Ootacamund for three years, and, in concert with Mr. McIvor, to investigate on the spot the various questions connected with the elaboration of alkaloids, the harvesting of the bark, the most economical and efficacious mode of preparing the febrifuge, &c. &c. Mr. Markham's arguments have convinced us that the appointment of such an officer is very desirable, in the interests alike of the Government and the people, and we beg, therefore, to support Mr. Markham's recommendation. You will observe from Dr. Cleghorn's memorandum (which forms one of the enclosures of Mr. Markham's first report), that the services of the person employed

ployed on this duty may also be turned to profitable account in utilizing the medicinal plants of India generally, and we recommend that such work should be declared part of his duty, in subordination, of course, to the primary object of his appointment. We must leave the selection of a suitable person to you, as we are not aware of anyone in India who has made quinology a special subject of study, or whose conclusions would carry weight in Europe.

II. The restriction of the Maillkoondah plantation to 200 acres, to be employed solely as a means of propagating and diffusing the chinchona in that neighbourhood. In our Despatch dated 25th December 1865, No. 75, we mentioned that in consequence of the receipt of your despatch of the 30th September preceding (No. 27, Public), we had postponed the consideration of the extent to which our planting operations should be carried. On referring to our minutes, which accompanied that Despatch, you will observe that our president proposed that our actual cultivation should be limited to 1,200 acres, distributed over our four plantations, that a further aggregate area of 1,000 acres should be reserved for future possible requirements, and that the land occupied in excess of this extent of 2,200 acres should be sold.

			Cultivation.	Reserve.	Total.	To be Sold.
			<i>Acres.</i>	<i>Acres.</i>	<i>Acres.</i>	<i>Acres.</i>
1. Neddiwuttum	-	-	500	100	600	—
2. Pykara	-	-	250	300	550	—
3. Dodabet	-	-	250	300	550	450
4. Maillkoondah	-	-	200	300	500	2,000
			1,200	1,000	2,200	—

We recommend that the extent proposed be cultivated at the three first plantations, and we consider it also very desirable that the proposed reserves at each should be maintained, as they will add considerably to the value of the plantations if these are at any time sold, and will be useful, meanwhile, in many ways. As to the retention of the Maillkoondah plantation, either on its present footing or as proposed by Mr. Markham, we solicit your instructions. The decision of the question must, we apprehend, depend entirely on your views as to the extent to which we should carry our operations generally. If it be your wish that we should make it our aim to provide a sufficiency of quinine for the public establishments throughout India, and of some cheaper, though still efficacious, preparation for the poorer classes, trusting to private enterprise for the production of all that may be required for other demands in India and elsewhere, it would scarcely be prudent, at present, to give up this plantation, although operations at it might be carried on more gradually. If, on the other hand, you consider that more should be left for private enterprise to supply, it will be for consideration whether the Maillkoondah site should be given up altogether. The land is, as Mr. Markham declares, “the best site for a chinchona plantation that has yet been selected,” and will sell well. Considering the short distance of the Maillkoondah plantation from Ootacamund, Pykara, and Neddiwuttum, we do not see any advantage in retaining it solely for the purposes of propagating plants to be distributed gratuitously to private individuals, as proposed by Mr. Markham. Our means of propagating plants at Ootacamund are amply sufficient to meet all demands, and can, if necessary, be extended; and obviously it is more economical and effective to maintain one large propagating establishment at the superintendent’s head quarters than to keep up several at different places. We shall, as speedily as possible, have a good road made to the Koondahs, and if the plantation be abolished, private individuals will be able to procure their supplies of plants from Ootacamund, easily and cheaply, and will be relieved from all competition on the part of Government in the labour market. We are clearly of opinion that the Maillkoondah plantation should either be retained, in addition to the others, or be sold. The intermediate plan recommended by Mr. Markham does not, in our judgment, hold out any advantages commensurate with the expense, &c., that it will entail.

We beg to be favoured with your early instructions on this question, as well as on the extent of land to be cultivated and reserved at the other plantations.

III. The gratuitous distribution of plants and seeds to all applicants. We are unable to concur with Mr. Markham in this proposal.

500 rupees for 1,000 plants.
300 " for 500 ditto.
200 " for 150 ditto.
100 " for 50 ditto.
4 rupees per plant for any number under fifty.

Note. The number planted out in the Government plantations, the requirements of which have of course been first met, is 244,000.

In 1863 Mr. McIvor proposed the scale of prices marginally noted, ranging from four rupees to eight annas per plant. We, however, considered four annas or sixpence per plant, whatever number might be taken, sufficient; and, in September last, we reduced the rate to one anna or three halfpence per plant when 5,000 or more were taken, and two annas or threepence per plant for less than that number. Mr. McIvor's last return shows that up to the 31st December last (when the reduction of price could not have had much effect) nearly 84,000 plants had been distributed. We consider an uniform price preferable to one graduated according to the number of plants taken, where, as in this instance, the price is regulated by the cost of production without reference to profit. Moreover, at the present rate, a person who actually requires only 3,000 plants finds it cheaper to buy 5,000, and throw away the surplus 2,000. We have therefore desired Mr. McIvor to charge one anna per plant whatever number may be taken, but, beyond this, we do not think it advisable to go at present. We have desired Mr. McIvor to submit his views on the question. The introduction of the chinchona, it must be remembered, has cost the State a large sum, and the simplest mode of recovering the money expended in producing the plants is to levy a price on them; and, as the cultivation of the chinchona promises to be highly remunerative, there can be no valid objection to the trifling charge we make. We believe that, as a general rule, articles that have to be bought are more cared for than those which can be procured *ad libitum* for nothing; and we would further remark, that if we are to distribute plants gratuitously, the work of propagation will be left entirely to us. No private individual will undertake the labour, expense and risk of raising plants for himself, or for sale to others, if they can be procured free of charge from our establishments.

IV. The adoption of vigorous measures, in a variety of ways, to induce the inhabitants of feverish tracts to include the chinchona among their products, both for their own consumption and for sale.

We are by no means insensible to the importance of this, but it is a measure which cannot be forced, and our experience makes us less sanguine than Mr. Markham, of the rapid or general success of such steps as he suggests. The culture of chinchona will doubtless pass through the same phases as the culture

Neilgherries	-	-	67,302
Bengal and North West	-	-	6,127
Coorg	-	-	4,236
Wynad	-	-	3,217
Travancore	-	-	537
Bombay	-	-	289
Burmah	-	-	270
Goa	-	-	252
Java	-	-	231
Nagpore	-	-	197
Canara	-	-	157
Shervaroys	-	-	150
Mauritius	-	-	108

North Arcot	-	-	107
Cochin	-	-	100
Reunion	-	-	51
Punjab	-	-	50
Algiers	-	-	45
Vizagapatam	-	-	35
Madras	-	-	24
Mysore	-	-	24
Melbourne	-	-	28
New Zealand	-	-	23
Malabar	-	-	12
Pulneys	-	-	12
Jamaica	-	-	2

of other exotics: coffee, for example, which is now so extensively grown by native agriculturists. We annex a table showing the distribution of the plants sold; and you will observe from it that, as was to be expected, the great bulk of the plants have been purchased by residents on the Neilgherries, where there is so large an extent of land specially adapted to the chinchona, and unsuited to its present rival, coffee, and where also the

singular success attending the cultivation of the plant is so well known, and the expenses and risk of conveyance are comparatively so trifling. Elsewhere, naturally enough, the demand has as yet been small; but 4,000 plants have gone to Coorg and 3,000 to Wynad, and this in tracts so well adapted for coffee is by no means discouraging, considering that only two years have passed since plants were procurable. From these localities the cultivation will spread gradually to every place where the soil and climate are favourable, and we believe that the greatest impulse will be given to its diffusion by our distribution of the medicinal product of the tree. As soon as the people are convinced of the efficacy of quinine (the very name of which is unknown to thousands) they will take to the culture of the plant with avidity. We beg to draw your attention to the marginal extract from Mr. McIvor's last annual report,* as showing that we are scarcely yet

* "The majority of English gentlemen engaged in cultivation on these hills, from want of experience, have been unsuccessful in propagation, and also in transplanting these delicate plants, although qualified to carry on the cultivation successfully when the plants are established or delivered

yet in a position to carry out such extensive measures as Mr. Markham suggests, and that we should incur considerable risk of failure if we were to make a distribution of such delicate plants to unskilled ryots. We shall impress on Mr. Melvor the absolute necessity of sending out well-established plants only. As soon as a sufficiency of these is available, we shall adopt measures to induce the people to cultivate the chinchona, but any expectation of such an immediate and universal spread of its culture as Mr. Markham contemplates is little likely to be fulfilled.

We do not consider it desirable to adopt Mr. Markham's suggestion, that a person selected by Mr. Levinge, the collector of Madura, should be sent, at the public expense, to Ootacamund, there to receive instruction in the cultivation of chinchona, which he is afterwards to carry out on the Pulney Hills. Mr. Levinge, as a covenanted civilian, cannot hold land or engage in agricultural pursuits, and his duties as collector and magistrate preclude his residing on the Pulneys (distant 44 miles from the head quarters of his large and important district), or even visiting them with sufficient frequency and regularity to supervise such operations. As yet there are very few Europeans holding lands on these Hills, and we cannot think it expedient that Government should extend their operations beyond the Neilgherries. We can always distribute the febrifuge cheaply and, if necessary, gratuitously, and it is not desirable that we should engage as cultivators of the chinchona in other localities.

V. The immediate location of convicts at Neddiwuttum. Our Judicial Proceedings noted in the margin will show you what measures we have adopted with this end, and that our difficulty has been to provide for the safe-guarding and medical care of the convicts in such a remote locality. The Inspector General of Gaols is now at Ootacamund arranging for the immediate transfer, if practicable, of convicts to Neddiwuttum.

Proceedings, 3 August 1864,	Nos. 60-62.
„ 4 Dec. 1865	„ 21-24, Judicial Dept.
„ 15 Jan. 1866	„ 183, 184.
„ 26 Jan. „	„ 455, 456.
„ 6 Feb. „	„ 74, 75, Judicial Dept.
„ 20 Feb. „	„ 383, 387.
„ 5 March „	„ 60, 61.
„ 8 March „	„ 148, 149.

6. We enclose a communication from Dr. Cleghorn, our conservator of forests, containing a memorandum on the garden of his Highness the Maharajah of Travancore, at Peermade. We have, as you will perceive, instructed Mr. Melvor to afford every assistance sought by the Resident.

Proceedings, 21 Feb.
Nos. 405, 406.

7. We beg to be furnished with three copies of Mr. Howard's work "Illustrations of Nueva Quinologia of Pavon."

— No. 85. —

From *Clements Markham*, Esq., to the Secretary to Government, Revenue Department, Fort St. George.

Ootacamund, 16 January 1866.

1. WITH reference to paragraph 8 of the Despatch from the Secretary of State for India, dated 30th September 1865 (Public, No. 27), I have the honour to submit my views on the subject of chinchona cultivation for the consideration of his Excellency the Governor of Madras in Council.

2. The objects of the Secretary of State in sanctioning the measures which I adopted for the introduction of chinchona plants into India, and in causing plantations to be formed on the Neilgherry Hills, were the provision of an abundant and cheap supply of the febrifuge derived from them for the use of hospitals and troops in India, and the spread of chinchona cultivation throughout the Hill districts, in order to bring the remedy within the reach of all classes of the native population. His views on this point are distinctly stated in Despatches dated 16th January 1863 (paragraph 4), and 30th September 1865 (paragraph 5).

3. Two

to them in such a condition as to be easily transplanted. Our recent improvements in the preparation of the young plants will enable us to deliver them in such a condition as they cannot well be injured in transplanting."

3. Two preliminary steps have now been successfully taken towards the attainment of these important ends. The most valuable species of chinchona have been introduced from South America into India, and, thanks to Mr. McIvor, they have been converted from wild into cultivated plants. But the actual work which will lead to the attainment of the desired results has yet to be done. The ground has been most ably and zealously cleared. Six years ago chinchona plants, with the exception of 250 in Java, where wild forest trees, and their bark was only procured by perilous searches in the trackless wilds of the Eastern Andes; while a product so obtained was necessarily sold at a price which put it beyond the reach of millions of sufferers from fever. Now the most valuable species are cultivated on plantations in India; their habits and requirements have been successfully studied, and the best method of producing the largest amount of febrifuge alkaloids in the bark has been ascertained beyond a doubt. It remains to discover the most economical and efficient method of bringing the febrifuge product of the bark within the reach of the people of India, and to adopt such measures as will achieve this result. The consideration of these points has engaged my attention for several years, but I was unable to arrive at any definite conclusions until I had personally inspected the plantations, and had fully discussed the numerous difficult and complicated questions involved in this great undertaking, with Mr. McIvor. I now propose to submit certain recommendations for the consideration of his Excellency in Council, 1st, with regard to the treatment of the bark harvest; and, 2nd, in connection with the spread of chinchona cultivation.

4. But, before entering upon the main subjects of this report, I cannot refrain from an expression of my admiration at the ability and zeal with which Mr. McIvor has conducted the operations connected with chinchona cultivation. The results he has attained are altogether unprecedented in the annals of arboriculture. The information respecting the plants, which was available for his guidance, was very scanty. I and other South American travellers were able to furnish him with more or less complete details respecting the climate of their native habitat; the elevations at which the different species should be planted; and their habit of growth in the forests of the Andes. But we could only tell him of forest trees engaged in a struggle for life with their neighbours, and, therefore, growing under very unfavourable circumstances for the elaboration of the precious alkaloids in their barks: he, with the aid of such data as we could supply, had to discover the numerous requirements of the plants when under cultivation, and the treatment which would be most favourable for the formation of the alkaloids. The success he has attained in the short space of five years is quite astonishing. It may be seen in the ravines of Dodabetta, where the species which cured the Countess of Chinchon is flourishing in a fashion such as was never known on the heights of Uritusinga or Cajanuma. It may be seen from the falls of Pycara, where an avenue of beautiful trees will soon relieve the sombre sameness of a scrubby Neigherry sholah. It may be seen far and wide along the slopes of the Neddivattam Hills, and it will soon be visible in the rich and fertile soil of the Mail Koondah forests. It is with no ordinary feelings that I have seen all this, and have been gratified with the thought that days of toil and nights of fever in the Caravayan forests, and subsequent weeks and months of intense anxiety, have been so fully repaid. We, who have laboured in South America, are amply rewarded for our work by the knowledge that it has been taken up and continued by so skilled and talented a cultivator as Mr. McIvor. I was particularly struck with the thorough and complete way in which all work has been done on the plantations. The buildings, roads, bridges, and arrangements for drainage are all excellent; and the system of management which has been established is manifestly working admirably.

5. It is unnecessary that I should touch upon the numerous points connected with chinchona cultivation, which are fully discussed in Mr. McIvor's reports. His method of propagation is most successful; and his system of planting in the open, instead of under shade, could never have been questioned if the opinions of those who were personally acquainted with the chinchona forests had been regarded; but the more recent conclusions at which Mr. McIvor has arrived are so closely connected with the questions relating to the treatment of the bark harvest that they necessarily come within the scope of my remarks. I now proceed

ceed to lay before his Excellency in Council the conclusions at which I have arrived respecting the treatment of the bark harvest.

6. The growth of the trees in the most advanced of the plantations—the first Denison—is remarkably rapid, especially as regards the increase of girth and the development of bark. The species which has most completely naturalised itself in India is undoubtedly the *C. succirubra*. I found the finest trees of this species to average, under favourable conditions, a height of 6 feet and a girth of 6 inches in the first year, of 10 feet and 13 inches in the second, and of 15 feet and 15 inches in the third. But it is in the thickness of the bark and the increased yield of alkaloids that the most marked results have been obtained, and Mr. Howard's analyses have shown that the method of mossing the stems, which is adopted by Mr. Melvor, secures the largest attainable deposit of alkaloids in the bark, as well as its most rapid and effectual renewal. This will perhaps be most readily seen by the examination of a table showing the yield of unmossed and mossed bark (both original and renewed) at different periods of growth, as follows :—

C. SUCCIRUBRA.

Age of Bark.	Mossed Bark.				Unmossed Bark.			Renewed Bark.
	Time under Moss.	Purified Alkaloids.	Crystallized Sulphates.	Chinchonine.	Purified Alkaloids.	Crystallized Sulphates.	Chinchonine.	
Years.	Months.	Per Cent.			Per Cent.			
1	6	3.40	2.80	0.60	2.59	—	—	Renewed bark aged 1 year on a tree aged 3 years, yielded 9.72 per cent. of purified alkaloids, 2.72 of crystallized sulphates.
2½	12	6	5.20	0.80	5.06	2.43	—	Renewed bark aged 1 year and 5 months on a tree aged 3 years, yielded 7.7 per cent. of purified alkaloids, 5 of crystallized sulphates.
3½	11	8	6.94	1.06	—	—	—	Dr. de Vry obtained 11 per cent. of alkaloids from the same sample.
3½	18	—	11.34	—	—	—	—	The renewed bark which gave 2.72 per cent. of crystallized sulphate when 1 year old, on a tree aged 3 years, gave 5.85 when 18 months old.

It will thus be seen that the yield of valuable alkaloids on a tree of this species aged two and a half years is 2.43 per cent. when unmossed, and 5.20 when the bark has been mossed for a year; and that the yield of mossed bark is steadily on the increase from 2.80 when the bark has been mossed for six months on a tree a year old, to the altogether unprecedented result of 11.34 per cent. when the bark has been mossed for 18 months on a tree three years and a half old. The yield from renewed bark is equally promising, giving 2.72 per cent. of the valuable alkaloids when one year old, and 5.85 when 18 months old. These results give us the certainty that the correct method of treating the chinchona trees is to cover the stems with moss, to remove the bark in strips periodically, to renew the bark by the mossing system, and to allow the tree to continue growing until it attains to its utmost size. We have not yet ascertained the extreme limit of the possible yield of alkaloids from this species, but it seems certain that it is still rapidly on the increase. It grows in perfection at an elevation of from 4,000 to 5,000 feet above the sea. At a lower elevation the bark is naturally much thinner and less rich in alkaloids, yet there is every reason to expect that even on coffee plantations, at 3,000 feet, the adoption of

the mossing system will lead to the production of bark which will give such a return as to make the cultivation profitable.

7. Although the above system of cultivation is undoubtedly the one best calculated to give the largest returns, and therefore the one that must be adopted on the Government plantations, as well as on all private estates where care and skill can be bestowed on the cultivation; it will yet require extreme attention and the personal superintendence of an instructed cultivator. Some simpler method must be taught to the numerous native chinchona growers, who will, I trust, soon commence work throughout the hill districts; as well as to planters and others who merely raise the trees for the sake of supplying a febrifuge to their coolies. In such cases I would recommend the system which his Excellency the Governor has proposed in paragraphs 9 and 10 of his Minute, dated 30th October 1865, and which will, I have no doubt, prove both profitable and perfectly simple in practice. In wandering through the chinchona forests, both in 1853 and 1860, I of course encountered thousands of stems of felled trees, and in every instance I observed that fresh shoots had been thrown up, and had frequently grown into decent sized trees. During my visit to Hak-galla in Ceylon, I examined the stem of a *C. succirubra* tree which had been cut down in April 1864, and observed exactly the same thing, a shoot had sprung from the stem, and grown up quite straight to a height of five feet, with a girth of five inches near the ground. The same thing has taken place on the Neilgherries on every occasion when a chinchona tree has been cut down, and there is an excellent example of the vigour with which these shoots grow, in a tree growing amidst brushwood, just outside the gates of the first Denison plantation. It is a clearly ascertained fact that the felled stumps do send up vigorous shoots in this way, and we know that they may be periodically cut down, and that, by treating the bark with moss, a large per-centage of alkaloids will be annually obtained, as the shoots reach the age of three or four years. While then the more profitable, though more difficult and scientific, system is adopted in the Government Plantations and in all large undertakings, the coppice-wood method of cultivation will perhaps be more extensively resorted to by the numerous class of growers, who will raise bark for their own immediate use.

8. I observed that the *C. succirubra* trees at Neddivattam exhibited two varieties, one with the usual pink flowers and rich green leaves, the other with nearly white flowers and paler leaves. It is important that the cause of this difference should be clearly ascertained, as a full knowledge of all phenomena connected with the growth of the trees is of consequence to the cultivator. This is one of the numerous points which require investigation by a scientific quinologist on the spot, a subject on which I shall dwell more fully presently.

9. With the *C. succirubra* grow the various species which yield grey bark, and which seem in India to be generically known as *C. micrantha*. I may remark, in passing, that India owes the possession of this very important group of chinchona species to the measures taken by Mrs. Markham at Arequipa. (See "Chinchona Blue Book," pp. 119-23.) The *C. micrantha* grows with and at about the same rate as *C. succirubra*, averaging a height of 10 feet, and a girth of 12 inches when aged two years, and of 13 feet with a girth of 13 inches at three years. I have spoken of this species as important, because, whereas in its native forests of Huanuco and Huamalies, it yields almost exclusively the chinchonine, an alkaloid of inferior value as a febrifuge. Mr. Howard has found that, under cultivation, the chinchonine almost disappears, and that in its place the *C. micrantha* bark yields an extraordinarily large per-centage of the valuable alkaloid, quinidine. The effect of mossing on this bark is also as marked as it is on that of *C. succirubra*. Unmossed bark (aged two and a half years) of *C. micrantha* yielded only 1.86 of alkaloids, while bark of the same age, after it had been mossed for a year, gave as much as 7.52 per cent. of alkaloids, of which 5.82 was of the valuable sort. This is a very significant result. Here is a kind which is almost worthless in its own forests, but which, under careful cultivation, has been made to substitute the efficacious quinidine for its wild product chinchonine. Though it will probably never yield quinine, *C. micrantha* may now take its place on almost an equal footing with *C. succirubra*, and these two valuable species will form all the plantations at a lower elevation than 6,000 feet. The exact influences which have produced this extraordinary change in the products of *C. micrantha* bark

are possibly hit upon in Mr. McIvor's interesting and very able letter to your address, dated 24th November 1865 (No. 105); but it is quite essential that the progress of the cultivator should be assisted and guided by the investigations of the chemist, and these investigations must be made on the spot both with green and dried bark, and with plants growing under various circumstances. Without this aid the ablest cultivator must move more or less in the dark.

10. The *C. calisaya*, the most famous of all the South American bark trees, and which in its native forests is alike the most beautiful and the richest in quinine, has not been a success in India. I was grieved to see the plants of this species only five feet ten inches high, and six and a half inches in girth, at an age of three years, while their stunted and shrubby appearance, with dim coloured leaves, is as different as possible from that of the glorious *calisaya* of the caravayan forests. Mr. Howard's analysis of the Neilgherry *calisaya* bark is also exceedingly disappointing. Yet there can be no doubt that we have the true species, for the plants at Neddivattam are descended from those procured by Dr. Weddell himself in the forests of Caravaya and Bolivia. There will soon be a large supply of *calisaya* seedlings, both from the trees themselves and from the seeds obtained by Mr. Money, and a further extensive and careful trial of this most valuable species may be made. But here again the assistance of a scientific quinologist is essential, in order to discover and counteract the influences which have hitherto been so inimical to the development of *C. calisaya* on the Neilgherries.

11. The plantations at a higher elevation than 5,500 or 6,000 feet above the sea, and up to 8,350 feet, will consist of the several varieties of *C. officinalis* of Linnæus, and of the trees (*C. lancifolia* and *pitayo*) yielding the precious barks of new Granada. So long as they are kept clear of the severe frosts of the valleys, the plants of *C. officinalis* flourish luxuriantly on the higher slopes of the Neilgherries, and indeed they are now the most numerous of all the species. The effect of mossaing on the product of the bark of *C. officinalis*, known in commerce as crown bark, has been most satisfactory. From a tree a year and a half old, unmossaed bark gave a total of only 1·50 per cent., of which nearly half was chinchonine; while bark that had been mossaed for four months yielded 2·408 of quinine alone. The unmossaed quills of this bark, known to the trade as Colorado del Rey or rusty crown, will already fetch 1 s. 3 d. to 1 s. 4 d. per lb. in the London market. They are very much used by chemists in making bark preparations. The species is evidently capable of much improvement, it flourishes on the open grass land as well as in that of the sholas, and I am convinced that *C. officinalis* plantations will be very remunerative. *C. lancifolia*, of which there are now about 160 plants, is also valuable, and the undescribed species yielding the *pitayo* bark is by far the richest in alkaloids of any yet discovered. Even in its wild state the bark sent home with seeds collected by Mr. Cross, yielded 11·34 per cent. of alkaloids, of which 5·85 was quinine, 4·19 quinidine and chinchonidine, and only 1·30 chinchonine; and parcels in the market are selling at prices 10 per cent. higher than those of *calisaya* bark. The *piñon de pitayo* bark belongs to a hardy tree which will flourish with *C. officinalis* on the higher slopes of the Neilgherries, Pulneys, and Koondahs; and, when treated with moss, it will increase even its present enormous yield of alkaloids. Knowing the great importance of introducing this species, I have made numerous attempts to procure seeds, and during the last two years I have engaged Mr. Cross to collect them in the neighbourhood of Popayan. That energetic gardener has at last forwarded a small instalment of these precious seeds, and we are now watching in great anxiety for signs of their germination. I enclose a copy of Mr. Howard's report of an analysis of the *pitayo* bark forwarded with the seeds.

Enclosure, No. 1.

12. Having offered the above remarks on the most recent results of cultivation with regard to the different species of *chinchona*, I now proceed to discuss the main subject of this section of my report. The method of taking the bark from the trees has been fully explained by Mr. McIvor in the specification of a patent which he has recently taken out. There are, however, several complicated questions relating to the best way of drying it and preparing it for the market, which we have considered and discussed together, but which cannot be finally settled until we have the aid of an experienced quinologist who can try experiments on the spot.

13. Here the work of the chinchona planter is completed. His bark is ready for the market, and he only has to obtain the best price he can for it. But it is only here that the most important part of the measure undertaken by the Government commences. The principal object of the Secretary of State was to provide a cheap and abundant supply of the febrifuge for the people of India. The problem to decide is, therefore, the form which the bark should take after it has been harvested, in order to attain the great and beneficent end in view.

14. Long before quinine was discovered, decoction of bark had cured thousands of sufferers from fever; and this simple form of the febrifuge is destined, I trust, to prove a blessing to many a fever-haunted district of India. Its manufacture is so simple that it may be carried on by every family that has a few trees planted at its door. It is merely necessary to pound the bark up until it will pass through a rather fine sieve, mix in the proportion of about ten ounces of bark to one gallon of water, boil, and strain off.

15. It is very desirable, however, that the alkaloids themselves extracted from other ingredients of the bark, should be brought within the means of the poorest native family, and until this is done chinchona cultivation in India is not a perfect success. To suppose that this can be effected by sending bark to England, to be turned into quinine and sent out again for sale at 20 shillings an ounce, is absurd. It is essential that some rougher and cheaper way of extracting the alkaloids should be hit upon, since the cost of producing the crystallised sulphates put them out of the question; and I have devoted much anxious thought to the consideration of this important point. I have now no doubt whatever that the alkaloids can be extracted in a form which will lead to the desired result, and further investigations will show what preparation is cheapest and most efficacious. Meanwhile, my own opinion, founded on actual experiment, is that the preparation called quinium will solve the question.

16. Numerous attempts have been made, from time to time, in South America, to extract the alkaloids roughly, in order to escape the expense of paying freight for so bulky an article as bark. Something of the kind was tried at Loxa in Ecuador; a Frenchman ruined himself in an attempt to establish a manufactory for this purpose at Puno, on the banks of lake Titicaca; and an Italian, at La Paz in Bolivia, actually invented the preparation called quinio or quinium, and gave some to Von Tshudi, the well-known German traveller. The method was afterwards adopted by M. de Londre of Havre, and in the French works on pharmacy it is called "*Extrait alcoolique de quinquina a la chaux.*" I received a practical lesson in the manufacture of quinium from an eminent chemist in London, and the process is so simple that a brief account of it will not be out of place here.

17. The method we used differed slightly from that described in the *Journal de Pharmacie et de Chimie*, Tom. 33 (1858), p. 73. The object is to separate the alkaloids from the lignin, gum, starch, acids, colouring matter, and other ingredients of the bark. The first process is to mix the pounded bark with half its weight of slaked lime and a little water, and this mixture is allowed to stand for a few days in order to give time to the lime to work thoroughly. The lime takes up the acids, colouring matter, and other parts of the bark. The mixture is then treated with strong spirits and boiled. The febrifuge alkaloids are soluble in alcohol, so that when the liquor is strained off, it consists of spirits with all the quinine, quinidine, and chinchonidine contained in the bark, in solution. It then only remains to distil off the alcohol, and the residuum is the quinium, containing all the febrifuge virtue of the bark. In my experiment in London, 1,000 grains of calisaya bark yielded 68 grains of quinium, a pale brown substance, in appearance not unlike glue, which contained 33 per cent. of quinine.

18. During my stay at Ootacamund I have tried a similar experiment on a much larger scale, with bark and leaves of *C. succirubra* grown at Neddiwuttam. Mr. McIvor gave me his active assistance, and furnished a small still and the other necessary apparatus and ingredients. We mixed 10 lbs. of pounded bark with 5 lbs. of lime, and 6½ lbs. of leaves with 3½ of lime. To this was added 30 bottles of arrack, which was strained and distilled off, and a very satisfactory

satisfactory residuum of quinium was obtained. It is of a reddish colour, as a portion of the colouring matter of *C. succirubra* is soluble in alcohol. The cost of the slaked lime is a mere trifle, only 30 measures to a rupee, which is sufficient for the treatment of 75 lbs. of bark. More than two-thirds of the alcohol is recovered by distillation, so that the actual cost of a bottle of arrack at one rupee is not more than four or five annas, probably much less when quinium is manufactured on a large scale. I shall have the quinium which we have obtained very carefully analyzed, but I have already ascertained that it is a strong febrifuge. It can be made up into quinine pills, each containing two to three grains, and a rough calculation leads me to the conclusion that it can eventually be sold at a few annas the ounce. The manufacture is so simple that it can be taught to all native dressers, and made without expense or trouble at hospitals and dispensaries.

19. Although I would not venture to give a positive opinion until the whole subject has been investigated on the spot by a competent quinologist, I yet think that quinium manufactories at every place where there is a local supply of bark will lead to the achievement of the great object of chinchona cultivation in India, namely, the provision of an abundant and cheap supply of the febrifuge in all fever districts; but there is one consideration which at first sight would appear to be fatal to success, and which therefore requires attention. It would naturally be supposed that if the alkaloids can be extracted in the form of a quinium at an exceedingly cheap rate, the tendency of speculators will be to buy it all up for sale to quinine manufacturers in the European markets; this, however, will not be the case, because quinium is not saleable for manufacturing purposes. It is for this very reason that I anticipate success from the manufacture of quinium in India. The failure of all attempts to substitute quinium for bark in the South American trade convinced me that the same result would attend similar attempts in India, and thus there is no danger that the plentifulness and cheapness of the febrifuge in this form can be interfered with by unscrupulous speculators.

20. The reasons why quinium, though containing all the febrifuge virtue of the bark, and therefore an efficacious medicine, is of no use to the quinine manufacturer, are partly explained by Mr. Howard in the last paragraph of his report of an analysis of bark, dated 15 June 1864: "Importers," he says "reap in the end more profit from sending into the European market the raw material than the half manufactured product." The lime process has a deteriorating effect on the crystallizable properties of the alkaloids (which is what the manufacturers require), although their medical efficacy remains unaltered.

21. Dr. de Vry, the eminent quinologist, has told me of another preparation from the bark, which he is inclined to think will be more conducive to the objects in view than quinium. The process of making it is described in his report on some bark which I sent to him last July, a copy of which is herewith enclosed, it being the same as was adopted in that analysis. The ingredients required for the manufacture are diluted muriatic acid, which costs in England when bought by the carboy of some gallons, 2*d.* per lb.; solution of caustic soda, and apparently alcohol. But the expense of the chemicals will be very slight, two lbs. of muriatic acid and one of caustic soda being required for the treatment of a cwt. of green, and about double that quantity for dried bark. The preparation is in the form of a fine powder, which consists of all the febrifuge alkaloids of the bark.

Enclosure, No. 2.

22. I have entered into these details in order to demonstrate that a cheap medicine can be obtained from the bark, for the use of the working classes of India, which will practically be as efficacious as the expensive sulphate of quinine. It will be for a skilled chemist, in concert with the cultivator to decide, after careful consideration, whether the febrifuge powder of Dr. de Vry, or the quinium, or some other preparation is the one to be adopted for general use. My purpose now is to show clearly that the great end which was contemplated when the chinchona plants were introduced into India is by no means difficult of achievement.

23. One measure is, however, absolutely necessary for the success of this great undertaking. The cultivation of chinchona plants has now arrived at a

stage when the co-operation of a scientific quinologist with the cultivator has become of vital importance. There are numerous questions connected with the growth of the plants, with the elaboration of the alkaloids, with the drying of the bark, with the period when the bark has reached its highest per-centage of alkaloids, and with the manufacture of the febrifuge, which must be solved, and which can only be solved on the spot. I have indicated some of these points in paragraphs 8, 9, 10, 11, 12, 13 and 22 of this report. Indeed it is impossible to consider the subject of chinchona cultivation attentively, without seeing reason at every turn for the conclusion that the assistance of a skilled analyser and chemist, on the spot, is urgently required at this stage of the experiment. The enclosed Memorandum by Dr. Cleghorn will show that such a measure would be of great utility in various ways, independently of its principal object.

Enclosure, No. 3.

24. I would, therefore, strongly recommend that a quinologist of established reputation should be appointed to conduct the investigations above indicated, in concert with Mr. McIvor, say for three years. His duties, in addition to these investigations, would be to decide upon the form in which the febrifuge could be most economically and efficaciously prepared; to instruct medical subordinates and others in the method of manufacture, and to report whether or not it would be advisable to establish a manufactory of the sulphate of quinine itself in this country. In deciding upon the pay and allowances that should be attached to the appointment, there is, I believe, a good precedent in the office of Chemical Reporter in the North West Provinces.

Professor of Chemistry at Roorkee.

25. It is quite possible that, after all, it will be found advisable to establish a Government quinine manufactory here; but we have no data at present to form a decided opinion on that point. If such a measure is resolved upon, it will be a great boon to the planters, because they will be able to dispose of their bark at once; and to the natives, because the cheaper febrifuge will also be largely manufactured, while the refuse of the manufactory, in the form of quinoidine, can almost be given away in any quantity.

26. I would not venture to express any further opinion respecting this appointment if it was one of an ordinary character; but in truth the number of men who are capable of filling it is so exceedingly small that the choice is narrowed, so far as I am aware (and I have made diligent inquiries), almost to one man. There are several learned quinologists in Europe, some like M. Delondre, in extreme old age, while others, such as Dr. Phœbus, M. Guibourt, Mr. Weddell, Mr. Howard, Mr. Hanbury, Carl Zimmer, &c., are not in a position to accept an offer of this kind. But in Dr. J. E. de Vry, the well-known Dutch quinologist, who has already visited the Neilgherry plantations and analysed our barks, we have one of the first practical quinologists of the day, who is deeply interested in the present experiment, who has devoted many of the best years of his life to the study of the chinchona plant and its products, and who has been acclimatised in the tropics. I beg respectfully to suggest that, in the event of my recommendations being adopted, this appointment be offered to Dr. J. E. de Vry, whose services are, I happen to know, now available.

27. The 2d section of my report refers to the spread of chinchona cultivation throughout the Hill Districts of India, a portion of the undertaking which I believe to be of the first importance; because, by this means alone can the inhabitants of fever-haunted districts obtain the necessary supplies of bark without trouble or expense. There are two modes by which chinchona cultivation will be extended; the one by the operations of planters, the other by the action of Government officials, or by means of any machinery that may be available in the districts which are suitable for the growth of Peruvian bark.

28. I am desirous most earnestly to represent that the object in introducing chinchona cultivation into India was not to show that the culture would prove remunerative, and that the prospects will be such as to encourage private enterprise. Private enterprise should be encouraged in so far as it tends to spread chinchona cultivation in the various hill districts; and to this extent it will undoubtedly further the great objects of this national undertaking. But in some respects

respects the interests of the planter and the Government must be antagonistic. The Government must look to the medicinal, the planter to the pecuniary value of the bark. The planter merely desires to get a rapid return for his money and to keep up the price of bark. The object of the Government, on the other hand, is not to make money, which is no part of its functions, but rather to reduce the price of bark as low as possible, and to bring its use within the means of the poorest coolie in the land. It was to provide an abundant supply of the chinchona febrifuge for the people that the Secretary of State introduced this cultivation into India, and not to afford another means of making money to European speculators. But, while seeking his own profit, the planter does good service in extending the area of cultivation, and from this point of view alone can the interests of private enterprise be considered in connection with the Government measures relating to this subject.

29. Not only will extensive private plantations more or less conduce to the spread of the use of the chinchona febrifuge amongst the labourers employed upon them, but they will also open up important tracts of hitherto neglected country, and add to the revenue at the same time that they increase the general wealth of the community. Now that analysis has proved the value of bark grown in India, there seems to be every disposition on the part of planters to undertake its cultivation. As many as 84 pieces of land have been taken up on the Neilgherry hills, under the Waste Land Rules of 6th March 1863, covering more than 8,000 acres; and there are very few indeed of the purchasers who have not planted chinchona trees on their estates, while several intend to cultivate Peruvian bark exclusively, and on a very large scale. Many trees are also planted and growing well in the Wynaad district.

30. The Mail Koondah chinchona plantation will, from the planting point of view, be very important, because it will open up a new and magnificent country, and form a nucleus of propagation round which numerous flourishing private estates will congregate. It will thus, both directly and indirectly, prove a valuable source of revenue to the Government, and the completion of good roads to it will, in a very few years, give rise to the clearing and planting of many hundreds of acres in a hitherto absolutely unproductive district. The Mail Koondah plantation should not, I conceive, be more than 200 acres, and it should be used strictly for propagating purposes, on the same principle as that at Hakgalla, in Ceylon. In thus furthering the extension of chinchona cultivation, it will come strictly within the scope of the measure which is now producing such excellent results wherever its influence is felt.

31. The Koondahs are by far the finest hills I have yet seen in India. The forest cover their sides and crests, which bear more resemblance to the superb montanas altas of some parts of the Eastern Andes than to the scrubby sholas of the Neilgherries. The soil is of extraordinary depth and fertility, both in the forests and grass land, and there are abundant supplies of water. Indeed the scenery of these beautiful hills, the long lines of forest with all the varied tints of foliage, the rich grass land intervening here and there, the magnificent waterfalls and precipices, and the sharp peaked outline of the distant mountains—is far and away the finest I have yet seen in the Western Ghats. The land reserved by Government is, I am fully convinced, the best site for a chinchona plantation that has yet been selected, superior either to Dodabetta or Neddivattam. The land is well protected from severe gales; three or four ranges of forest-clad hills mitigate the force of the south-west monsoon, while there is no land intervening between Mail Koondah and the low country to the eastward, to prevent the plantation from receiving a good share of the north-east rains. A bullock track on such a trace as could be hereafter converted into a cart road, may easily be made, to connect Mail Koonah with the old Malabar road, and this plantation will then be much nearer supplies and labour than any of the others. Burgher labour is already procurable on the spot. I would recommend that the necessary works and communications connected with the Koondah plantation (which has been named Stanley, after the statesman who first sanctioned my proposals respecting the introduction of chinchona cultivation into India) be pushed forward at once, so that plants and seeds may be ready for distribution as soon as possible. An estate of 400 acres has already been partly cleared, in an admirable position, within a short distance of the Government plantation,

and others will soon follow. The progress of the Stanley plantation, in opening up the Koondahs, as well as in spreading chinchona cultivation, is quite as important as that of any of the others.

32. The Government chinchona plantations are of course of essential use to private cultivators, by furnishing them with plants and seeds, by pointing out the best methods of cultivation, by eventually taking the lead in the European market, and establishing the fame of East India bark, and probably by, hereafter, in the manufacturing operations, taking part of the bark harvest off their hands. I have already discussed most of these points, but I think it right to offer my opinion on the subject of the disposal of plants and seeds. The great object of the Government is to introduce and spread chinchona cultivation, and I have long been of opinion that the plants and seeds should be given away to all who are desirous of growing them, without any charge. The exaction of payment for them, especially as there is a per-centage of loss on the plants delivered, must have the effect of retarding the spread of the cultivation. In Ceylon, the plants are given away, the only expense to the cultivator being the carriage to his estate. A planter desirous of undertaking the cultivation signs a form, stating that he has available land suitable for the growth of chinchona trees, that he undertakes to plant the trees delivered to him upon the said land within 12 months, and to carefully cultivate them when so planted. These forms are filed; a register, open to inspection, is kept of applications; and each applicant is supplied in his proper turn. This plan has answered admirably; as many as 50 planters have already commenced the cultivation in Ceylon; 5,00,000 plants have been applied for, and 1,80,000 have been actually distributed. The price charged for chinchona plants on the Neilgherries has been lately reduced to one anna each when 5,000 and upwards are taken, and to two annas each for any number under 5,000. Now 5,000 is quite sufficient for any one cultivator to take, as he can propagate from his own stock for any quantity above that number. I would recommend, therefore, that the price of one anna be charged, as now, for each plant when over 5,000 are applied for, but that any number under 5,000 be furnished to applicants without charge. A register should be open for inspection, so that every applicant can see that he is served in his turn, and each applicant should sign a form similar to that in use in Ceylon. The argument in support of the practice of charging money for the plants is, I am aware, that a man will take more care of what he has paid for than of what he has got for nothing. I believe the argument to be fallacious, and that while a careless man will take care of neither, a careful man will not neglect any of his property that is worth taking care of. Any how, the plan of giving away the plants has answered perfectly in Ceylon, where many planters are taking great pains with them. It is most important that no charge for plants should be exacted from native growers, or from such officials as may be desirous of inducing the natives in their districts to grow chinchona trees; and, as no difference can fairly be made between applicants, the system of charging for plants, when the number applied for is less than 5,000, ought, I think, to be abolished. The great harvest of seeds, which is expected next spring, should be as widely distributed as possible, with instructions for sowing and rearing them, free of all charge.

33. The chief object of introducing chinchona plants into India is to bring the febrifuge within reach of the classes who cannot afford to buy quinine, or nearly the whole of the sufferers from fever. This beneficent measure has hitherto received little or no attention, and scarcely any efforts have been made to induce the natives themselves to cultivate chinchona trees, to cause clumps of the fever-dispelling plant to rise up round every village in the hill districts, and to see that each family is able to obtain fever bark, and understands its use. Until active steps are taken in this direction, and general success has been achieved, the Government cannot pause, for its most important work remains undone. The Secretary of State has expressed his sense of the importance of this part of the undertaking on several occasions, but especially in his Despatch dated 16 January 1863, where he points out that the commercial advantages of chinchona cultivation are merely a secondary consideration, and desires that collectors be directed to introduce the plants into the hill districts of their collectorates.

34. I beg

34. I beg to enclose, for the information of his Excellency in Council, an extract from a letter which I have addressed to the Under Secretary of State for India, dated 26 December 1865, on the subject of chinchona cultivation in Travancore and on the Pulney hills, and to draw special attention to the extracts which I have quoted from the admirable Minute by Mr. Maltby, the late Resident of Travancore, on this subject. His enlightened measures with regard to the establishment of a chinchona garden at Peermade, with a view to the spread of the fever-healing trees throughout the hill region of Travancore, should be adopted with reference to all other mountainous parts of India.

35. Endeavours should be made to induce all villagers in hill districts to include chinchona trees amongst their products, first for home consumption, and eventually for supplying bark to the villages and dispensaries in the adjacent plains. The machinery for effecting this would vary according to circumstances. Sometimes a collector or sub-collector would take a personal interest in a matter of such vital consequence to the people under his charge; at others a subordinate official or overseer in the forest department may take the work in hand; and it may be hoped that, at least in some localities, the natives, on receiving a little encouragement, will initiate the cultivation of their own accord. I would suggest that such slight assistance should be extended to these efforts by the Government as the circumstances may require, in order to secure satisfactory results.

36. For instance, Mr. Levinge, the collector of Madura, has successfully introduced some chinchona trees into the Pulney hills, at his own expense, with the intention of propagating from them, and I believe that Mr. Marden, of the Education Department, is seconding his efforts. A good beginning has here been made, and a little aid from the Government would ensure most important results. It is impossible for Mr. Levinge to be on the Pulneys for more than a few days at a time, while a little care bestowed on the matter from a permanent resident would lead to the cultivation of Peruvian bark at the very doors of every village in the fever-haunted lower Pulneys, and the growth of a surplus supply for the use of sufferers in the Cumbum valley and other parts. A measure of great utility to the inhabitants might thus be adopted at insignificant cost; and I beg strongly to recommend that the Government should pay the salary of a man selected by Mr. Levinge, who should receive instruction on the Neilgherries, and that a larger supply of chinchona plants be furnished for the experiment on the Pulneys. Mr. Levinge might be requested to submit his views on this subject.

37. If operations are ever commenced in connection with the Perryaur irrigation project, the opportunity should be seized of introducing chinchona cultivation into the forests near the banks of the Perryaur, for the use of coolies engaged on the works.

38. Then, again, the sub-collector in charge of the taluqs bordering on the mountains in Tinnevely might do much towards the introduction and extension of the growth of chinchona plants, and, if he is prepared to recommend any particular measure, a supply of plants and all other needful assistance should be furnished to him.

39. A great work, in connection with chinchona cultivation, will be done on the Annamallays at some future day. Extensive coffee operations have already been commenced at Ponachy, and the collector of Coimbatore may even now be able to recommend some measure, with a view to extending chinchona cultivation in that direction.

40. But I believe that the most useful work might be done in Wynaad, under the superintendence of the deputy collector, who has opportunities of explaining the value of chinchona cultivation to the natives, and who should be supplied with all the plants he may think it advisable to apply for. It seems very desirable that the views of the collector of Malabar on this point should be placed before the Government, and favourably considered.

41. The people of Coorg and of the Mysore mountains will, I have no doubt, avail themselves very readily of any opportunities that may be extended to them of obtaining and growing the chinchona; and I hope soon to submit a plan with this object in view, for the consideration of the Chief Commissioner. Any

number of plants and seeds that he may require will of course be furnished from the Neilgherry hills, in accordance with views expressed by the Secretary of State, in paragraphs 4 and 5 of his despatch, dated 16 January 1863.

42. If the above suggestions are favourably entertained by His Excellency in Council, and followed up from time to time as opportunities offer, a very great blessing will be conferred on the natives. The healing bark will be at their doors, and the powdered bark, or a decoction of it, will furnish them with an unfailing remedy for an otherwise incurable scourge. The work to be done is simple and easy; the good that will be effected is altogether incalculable. It is work that should take precedence of all fostering of private enterprise, and supplying of new investments for capital. Dr. Poeppig (*Reise II*, p. 223), in a passage which I have quoted in a note to my work (p. 506), gives testimony to the efficacy of the green bark as a cure for fever, from his own experience on three different occasions; and it is now in the power of the Madras Government to extend the blessing, then enjoyed by a solitary German traveller in Peru, to a great population of sufferers from fever in this country.

43. This, as it appears to me, is the work that remains to be done in connection with chinchona cultivation; and the necessary steps may now, I think, be foreseen, down to the time when the Government can fitly retire from active participation in it. Next to the measures suggested in the foregoing 10 paragraphs, the most urgent present work is the completion of the planting out of the 1,200 acres at the Neilgherry plantations. It will be advantageous, in every point of view, if this work is finished as quickly as possible; and the use of convict labour appears to be an excellent way of effecting this, while it is, at the same time, a convenience to the prison authorities. As I have had good opportunities of judging of the way in which this measure is working, during my recent inspection of the plantations, it may be useful if I state the impressions which I have received respecting it.

44. On 3rd August 1864, His Excellency in Council recorded an opinion that convict labour might with much advantage be made use of on the Chinchona plantations, and directed Mr. McIvor to submit plans for gaols, to accommodate 500 prisoners at Dodabetta, Neddivattam, and Mail Koondah. On September 6th, Mr. McIvor having completed the plans, his estimate of 21,225 rupees for the gaols, to be paid out of the Budget allowance for the plantations, was sanctioned; and the whole scheme was fully approved by the Government. The gaols are substantially built, and on an admirably devised plan both for health and security. That at Dodabetta consists of one, that at Neddivattam of two large and lofty rooms, with brick walls and roof, supported by beams of Angelly wood. Along each side, there are verandah rooms for dispensaries, offices, warders, &c., and the arrangements for guarding and inspection are very complete. The gaols have fire-places, the bed places are wooden planks raised 18 inches from the ground, and each prisoner has a rug and two cumblies. The drainage appears to be excellent. At the Dodabetta gaol there is a gaoler at 50 rupees a month, a head warder at 14 rupees, 4 warders at 10 rupees each (total salaries 104 rupees), and 17 policemen for 82 convicts. At Neddivattam there will be 6 warders and 32 policemen for 200 convicts.

45. The Dodabetta gaol was completed first, and the prisoners entered it on 20th September 1865, consisting partly of convicts from the low country, and partly of Chinese prisoners from the Straits Settlements; unfortunately, no one with proper authority was placed in charge of them. The joint magistrate at Ootacamund stated that it was impossible for him to visit the gaol, and Mr. McIvor had no powers. Thus, from the middle of September until the middle of December, the prisoners, I presume through some inadvertence, were left without any one but the gaoler to control them. The inevitable consequence was mutiny and insubordination. At last, in the middle of December, Mr. McIvor received powers, under the provisions of Regulation I. of 1833, as superintendent of the gaol at Dodabetta, and from that day, and not before, the experiment of using convict labour on the chinchona plantations commenced.

46. The result has, I think, fully confirmed the opinion of his Excellency in Council that convict labour might be made use of on the chinchona plantations with much advantage. Two or three days after Mr. McIvor took charge, there was

was an outbreak, the sure result of three previous months of anarchy. It was promptly suppressed, and the prisoners at once saw that good behaviour was their best policy. Ever since they have conducted themselves well; there has been no attempt at escape, no illness, no insubordination. They have worked well and cheerfully, and the experiment, now thoroughly tested, is a decided success. The clearest proof of this is to be found in the extra work done; for where there is a mutinous feeling or discontent, it is difficult to exact the regular tasks, while under the influence of opposite feelings, extra work is cheerfully done. The chief employment is pitting for Chinchona plants. Free labourers do 16 pits a day. The task of the convicts is to do 20 pits, of the Chinese 25 pits a day. For extra work they get half an anna for 5 pits. The native convicts average 7 pits a day of extra work each man, and the Chinese $8\frac{1}{2}$ pits. If cheerfulness at work, strict subordination, and an absence of sickness and of any attempt at escape, are any test of the success of a system of managing convicts, these results have been achieved at Dodabetta gaol during the last month.

47. The successful experiment at Dodabetta supplies the assurance that the same results will be attained at Neddiwuttam gaol, if Mr. McIvor is invested with similar powers. The gaol at Neddiwuttam is now quite completed and ready for the reception of prisoners, and it is very important, for several reasons, that it should be occupied by convicts without delay. In reliance on convict labour, the free labourers have been employed on the gaol instead of on the plantation work. If therefore the convicts are not sent up, the work will be thrown back in the plantations, the nurseries will remain overstocked, and very serious loss will be the result. The sums spent on the gaol will also have been wasted. Then it will be absolutely necessary to obtain other labour at all hazards, in order to prevent the great damage which otherwise will ensue. The labour market will thus be entirely disorganized, and there will be much consequent inconvenience and distress. On the other hand, the various advantages arising from using convict labour on these plantations, such as the relief of the crowded state of the Southern gaols, the great saving of expense to the State, &c. will be lost.

48. Any fear that there are special facilities for convicts to escape from these gaols is founded on a misapprehension of the facts. It stands to reason that if the buildings are arranged with equal regard to safe keeping and inspection, and have the same machinery for guarding the prisoners, there will be exactly the same chances of escape on the plains as on the hills, no more and no less. But the arrangements for custody and inspection in the gaols on the Chinchona plantations are superior to those of gaols on the plains, so that there are less chances of escape in the former, while the probability of final escape is very small. At Mail Koondah it is almost impossible for a native convict to get clear away.

49. The gaol at Mail Koondah, an exact counterpart of that at Dodabetta, is very nearly completed.

50. With convict labour, the work of planting the 1,200 acres will be completed in a little over two years. During this time, the quinologist will be conducting his experiments and investigations, and, in concert with the medical authorities deciding upon the important questions connected with the manufactory of preparations from the bark. On the departure of the convicts, the three handsome and substantial buildings at Dodabetta, Neddiwuttam, and Mail Koondah will be available for bark stores and manufactories. The quinologist will then be able to continue his operations on a larger scale, to furnish abundant supplies of the febrifuge, and to instruct numerous apothecaries and dressers in the method of manufacture. Dispensaries in every part of the country will be able to obtain and prepare their own bark. At the same time, the most advantageous moment for sending home the rich febrifuge-bearing bark will have been ascertained, and East Indian bark will stand so high in the European market that Chinchona plantations will, on all sides, prove highly remunerative. Meanwhile the cultivation of the Peruvian bark tree will have been extended to the utmost possible extent throughout the hill districts of India, and the quinine febrifuge will have been brought within the reach of every sufferer from fever in the land.

51. When these results are fully achieved, the Government may fitly pause; then and not till then, will the work be concluded, and the Government be justified, by the sale of plantations and manufactories, in receiving back with interest the whole of its outlay. One of the greatest and most beneficent measures that any ruler has ever undertaken for any country will at last be fully completed.

52. Trusting that the foregoing remarks and suggestions, all of which I have very carefully and anxiously matured, will receive favourable consideration from his Excellency in Council,

I have, &c.
(signed) *C. Markham.*

Enclosure 1, in No. 85.

From *J. E. Howard*, Esq., F.L.S., to the Under Secretary of State for India, dated 18 November 1865.

I HAVE the honour to report that I have examined the small packet of the fine red Piñon de Pitayo variety of bark, and find that it contains—

Sulphate of quinine -	-	-	-	-	-	-	-	-	5·85
Quinidine and chinchonidine	-	-	-	-	-	-	-	-	4·19
Chinchonine	-	-	-	-	-	-	-	-	1·30
									11·34

The total amount of alkaloids (after deducting the weight of sulphuric acid of the sulphates) may be given as 10 per cent. of the weight of the bark sent. This gives promise of an excellent result in the hands of Mr. McIvor, if the seeds should germinate in India.

Two parcels of this red Pitayo variety are in the market at the present moment, producing respectively, 5·00 and 4·70 per cent. of sulphate of quinine. The price asked for these, though less carefully selected than the packet sent by Mr. Cross, is about 10 per cent. beyond that of Calisaya. It will be seen from this that the bark is much esteemed in commerce.

I have also examined the packet of leaves sent, and find these to contain a proportion of alkaloid, on the exact nature of which I should be unwilling to offer an opinion, unless I had the opportunity of experimenting on a larger portion of the material.

(signed) *J. E. Howard*, F.L.S.

Enclosure 2, in No. 85.

REPORT on the Yield of two Chinchona Barks cultivated on the Neilgherry Hills, and sent to Dr. de Vry by Mr. *Clements R. Markham*, on 7 August 1865.

BARK, No. 1.*

THE bark dried at 212° Fahrenheit, and analyzed by my method ("Pharmaceutical Journal, August 1864"), yielded 3·16 grains of alkaloids, consequently 9·14 per cent., and 0·142 grains of quinic acid, or 0·41 per cent. Of these 3·16 grains of alkaloids, 1·48 grains were dissolved by ether, consequently 4·28 per cent. of alkaloids, soluble in ether, was contained in the bark.

2. The part soluble in ether, saturated with oxalic acid, yielded beautiful crystallized oxalate of quinine, and left an uncrystallizable mother liquor, from which was obtained an amorphous alkaloid, which I have found in all the young chinchona barks that I have analyzed.

3. The part insoluble in ether contained no quinidine, whilst the sulphate, obtained by its saturation with sulphuric acid, crystallized like sulphate of quinine, and not like sulphate of chinchonine. I consider, therefore, that the part of the alkaloids of this bark which is insoluble in ether, consists chiefly, if not entirely, of chinchonidine. The presence of chinchonine could not be ascertained, for if this alkaloid really exists in the analyzed bark, its quantity must be relatively very small.

4. During

* The numbers are those attached to the samples of bark in the Memorandum accompanying Mr. McIvor's letter to the Secretary to Government (Revenue Department), dated 3 May 1865.

4. During my experiments, I observed the relatively large amount of chincho-tannic acid contained in this bark, and also the absence of chlorophyll.

5. The yield of alkaloids being greater than I expected, I was obliged to change the filter upon which the precipitate of the crude alkaloids, mixed with an excess of lime, was collected, by which operation I sustained a small loss. The amount of alkaloids in the bark is, therefore, greater than the obtained quantity of 9·14 per cent. This was proved by the following experiment.

6. Ten grains of bark dried at 212° Fahrenheit, were lixiviated in a narrow glass tube, so that the column of bark powder had a length of 10 centimetres, by 150 cubic centimetres of diluted hydro-chloric acid containing 4 per cent. of pure acid, which lixiviation lasted three days. The liquid obtained by this process was afterwards precipitated by 15 cubic centimetres of a solution of caustic soda, and the precipitate collected on a filter. After washing and drying the precipitate, it was dissolved in alcohol, and the clear alcoholic solution, containing all the alkaloids of the 10 grains of bark, evaporated to dryness. When the residue of the evaporation had been so long heated on a water bath that its weight remained constant, it was proved that this weight was 1·116 grains. The analyzed bark consequently yielded 11·16 per cent. of alkaloids, which are forwarded with the report.

BARK, No. 2.

47·67 grains of bark dried at 212° Fahrenheit, and analyzed by my method, yielded 1·36 grains of alkaloids, consequently 2·85 per cent., and 0·293 grains of quinovic acid, consequently 0·61 per cent. Of these 1·36 grains of alkaloids, 0·77 were dissolved by ether, so that the bark consequently contains 1·61 per cent. of alkaloids soluble in ether.

The part soluble in ether, when saturated with oxalic acid, yielded beautiful crystallized oxalate of quinine, and left an uncrystallizable mother liquor, from which was obtained the abovementioned amorphous alkaloid. The part insoluble in ether contained no quinidine, but the quantity of 0·59 grains was too small to ascertain with certainty if this part contained either pure chinchonine, or a mixture of this with chinchonidine. During my experiments, I observed that this bark contains a large amount of chlorophyll.

CONCLUSION.

No. 1 bark is the most valuable specimen I ever met, as I never before manipulated a bark yielding the enormous quantity of 11 per cent. of alkaloids.

(signed) *J. E. de Vry.*

Enclosure 3, in No. 85.

MEMORANDUM.

THE indigenous materia medica of the hill ranges of Southern India is varied and extensive, and comprehends many plants of proved value.

2. The best means of bringing these into general use has often been discussed, and was under the earnest consideration of the Drug Committee (appointed by the Secretary of State for India) when I left London in September 1865.

3. A few of the many official plants, both indigenous and naturalized, which abound at or near Ootacamund, may be mentioned.

INDIGENOUS.		NATURALIZED.	
<i>Cannabis indica</i>	- - - Indian hemp.	<i>Argemone Mexicana</i>	- - - Oil.
<i>Berberis.</i>		<i>Digitalis purpurea</i>	- - - Leaves.
<i>Ophelia</i>	- } Chiretta, or hill gentian.	Mint-	- - - } Essential oils.
<i>Exacuna</i>		Peppermint	- - - }
		Lavender	- - - }
<i>Andrographis paniculata</i>	- - - Creyat.	<i>Hyosciamus</i>	- - - } Extracts.
<i>Gaultheria</i>	- - - Winter green oil.	<i>Taraxacum</i>	- - - }
<i>Pterocarpus Marsupium</i>	- - - Kino.	<i>Belladonna</i>	- - - }
<i>Citrus</i>	- - - Citric acid.	Scammony.	
		Jalap	- - - } Roots.
		Aconite	- - - }

4. The Superintendent of the Government Garden at Ootacamund could collect specimens of these and others, for transmission to the medical stores; but the preparation of the oils, extracts, &c., could not devolve upon him, and from the want of a properly qualified pharmaciën, there has been little progress made in the employment of hill medicines.

5. On this account, I concur in the proposal to engage a skilled pharmacist, in order that the medicinal plants growing around us may receive due attention, and the official preparations be made, in an approved manner, on the spot, from fresh leaves, seeds or roots. In the end, I believe this would prove an economical arrangement.

(signed) *H. Cleghorn, M.D.*

Coimbatore, 17 January 1866.

Enclosure 4, in No. 85.

MINUTE by the Honourable the President.

1. I HAVE before me Mr. Markham's report of his views on the subject of chinchona cultivation, and a variety of collateral topics connected with this, together with the minutes of the Members of the Government, upon certain propositions contained in a late despatch from the Secretary of State. As these are, to a certain extent, embodied in Mr. Markham's report, I shall deal with them as forming part of the subject which the Government has now to consider.

2. Before, however, I proceed to discuss the various heads of Mr. Markham's report, I may say that it is very satisfactory to hear, from him, so full an expression of approval of the system under which the plantations of chinchona have been cultivated. The success which has attended the experiment is attributable to the ability and zeal exhibited by Mr. McIvor, to whom, from the very commencement, the Government intrusted the whole superintendence and management of the plantations. It is but fair to Mr. McIvor to say, that he has taken a very extended view of the responsibility of his position. He has not only succeeded admirably in rearing and cultivating the plants, but has, by the many experiments which he has made, and is making, added very much to our knowledge of the qualities of the different species, and has also discovered a mode of cultivation by which the quantity of bark, and of the alkaloids which it contains, will probably be largely increased.

3. I think I shall bring the subject more clearly before the Government if I separate altogether the questions connected with the cultivation of the plant, from those which relate to the mode of dealing with the bark after it is removed from the tree; and I will first address myself to the subject of cultivation. In a minute which I submitted some months back, I gave an account of a visit which I had paid to the different plantations, and I, in that, recommended that the Government should cultivate 1,200 acres, and should reserve also certain portions of land in juxtaposition to each plantation, in order that if at any time it is thought fit to sell the plantations, and trust altogether to private enterprise for the supply of bark, these plantations might fetch higher prices in the market when capable of extension, than they would be if put up by themselves.

4. I gather incidentally, from Mr. Markham's report, that he is desirous to see the amount of land, viz., 1,200 acres, brought under cultivation as speedily as possible; but I also gather, from something which he says about the plantation at Mailkoondah, which he wishes to limit to 200 acres, that he does not consider the addition of waste land to each plantation advisable. It would be as well, I think, to let Mr. Markham see all the papers which have any bearing upon the subject of the cultivation of chinchona, in order that he may know all that has been said and written with reference to this, before he commits himself to any positive opinion on this portion of the subject. Mr. Markham's observations and recommendations on the subject of chinchona cultivation are contained in paragraphs 27 to 50. He brings prominently forward the fact, that the object of the Government in introducing chinchona cultivation into India, was, not to show that its culture would prove remunerative, and the prospects such as to encourage private enterprise, but rather to reduce the price of bark as low as possible, and to bring its use within the means of the poorest coolie in the land.

5. I think, however, that in laying so much stress upon the reduction of price, Mr. Markham has overlooked a distinct expression of opinion on the part of the Secretary of State, that it is desirable that such a return on the produce of the bark should be secured as will pay the original outlay and subsequent expenditure on the chinchona undertaking, with good interest. That the ultimate result of the extension of the cultivation of chinchona will be a reduction in the price of the febrifuge extracted from it is very clear; but this result must be produced by a very gradual process. In order to extend cultivation, the prospect of good returns must be held out to the private speculator; he must believe himself able to realize larger profits from chinchona than he can hope to do from either coffee or tea; for, unless he can do this, he will not risk his capital upon what is at present a mere speculation with the Government, of whose action he can but guess, as a competitor. Should the first planters realize large profits, other capitalists will soon be found to claim a share in these, and competition will bring down the price of bark to a minimum, which minimum will be regulated by the profits upon tea and coffee, the antagonists of chinchona, on the hills of India.

6. I cannot, therefore, think that it would be advisable to press Government aid upon those who have already commenced plantations in Travancore, the Pulneys, &c. The best encouragement which we can hold out to them will be, the success of our plantations. If we can show that these do yield a large return upon the capital laid out upon them, there will not be wanting men willing, and, indeed eager, to enter upon the cultivation of chinchona.

7. With reference to the proposals that the villagers in the hill districts should be induced to include chinchona trees among their products, first for home consumption, and next for supplying bark to the villages and dispensaries on the adjacent plains, I am afraid that no inducement which the Government could reasonably hold out would be productive of the least effect at present. Hereafter, when the value of bark as a product, is well established,

established, natives as well as Europeans, will be quite open to the arguments which are addressed to their pockets, and a gradual extension of cultivation will take place.

8. Mr. Markham proposes that seeds and plants should be given away to all who are desirous of growing them; without any charge. The Government has already reduced the price from four annas to one anna per plant, when more than 5,000 are taken, and it may be as well to make the reduction general, and to charge the same price per plant for any number, however small or however great; but I am not disposed to accede to Mr. Markham's proposal that they should be distributed gratuitously. It must be remembered that these plants have cost the Government a large sum, and the simplest mode of recovering this money is to put a price upon the article. I put more confidence in the saying "a man will take more care of what he has paid for than of what he has got for nothing," than Mr. Markham is inclined to do. Besides, if a man can always get what plants he requires from a Government establishment for the mere cost of conveyance, he will not do what Mr. Markham supposes, that is, go to the expense of making a propagating establishment for himself. While, therefore, I am not disposed to give away plants gratuitously, and thus to make to the cultivator a present of a sum of money equivalent to the price of about 800 plants per acre upon every acre he may choose to cultivate, I am not at all disposed to make extra profits upon these plants, but should willingly lower the price now charged should it be shown to be in any way excessive or unreasonable.

9. I am quite disposed to agree with Mr. Markham as to the advantages to be derived from the application of convict labour to the cultivation of the Government plantations; the difficulty which has prevented the extension of this to Neddiwuttum and Maillkoondah is one which has sole reference to the maintenance of proper discipline among the men at places so far detached from the head quarters of the magistrate. Attempts are now being made to overcome the difficulty, and I trust that the Government may be able to avail itself of the amount of convict labour at its disposal, so as to accelerate the completion of the different plantations.

10. I have noticed, I think, all the questions relating to the cultivation of the chinchona. I will, now, therefore, deal with those portions of Mr. Markham's report which allude to the mode of dealing with the bark.

11. I may observe, in the first place, that our treatment must be for some time empirical. We must make a variety of experiments, record their results, and finally be led to adopt the system which will produce the greatest quantity of the best description of bark from a given area at the least cost. I say the best description of bark, for I conceive that the interests of the Government as well as those of private individuals are in this identical; as soon as we have ascertained the best species of chinchona, it would be but a waste of money to continue the cultivation of the inferior kinds; it is to the production of a large proportion of the better description of bark that we must look if we wish to drive the inferior kinds of South American bark out of the market, and it is to the production of the best kind of bark that we must look if we wish to reduce the price of the febrifuge. It costs as much to cultivate and maintain a plantation of inferior trees as of the best kinds, the profit to be derived must therefore depend upon the quantity and quality of the produce.

12. Mr. Markham is of opinion that in India it would be desirable to use the rougher extracts of bark, instead of the more expensive sulphate of quinine; and he suggests a preparation which he calls quinium, as being, in the first place, cheaply and easily made, and in the second place effective as a febrifuge.

13. The Secretary of State made a similar recommendation as regards some of the other alkaloids contained in the bark. It would be very easy to add "quinium" to the list of preparations to be submitted for trial, and this had better be done at once, and it would be as well that the preparations should be made with Neilgherry bark, of which there will be an ample quantity when the three acres which I recommended to be treated as coppice are cut.

14. The experiments might be made by the chemical examiner here, but if the Secretary of State thinks it advisable to employ Mr. De Vry, I am inclined to think that the services of that gentleman might be found very useful in a variety of collateral inquiries.

9 February 1866.

W. T. Denison.

Enclosure 5, in No. 85.

MINUTE by the Honourable *T. Pycroft.*

1. I CONCUR generally in the views expressed by His Excellency the President in his minute on Mr. Markham's report on the Chinchona plantations of the Neilgherries. I will say a few words on each of Mr. Markham's proposals separately:—

First. That a quinologist of established reputation be located for three years at Ootacamund; that he may, in concert with Mr. McIvor, investigate on the spot questions connected with the elaboration of alkaloids, the preparation of the bark, the most economical and efficacious mode of preparing the febrifuge, &c. &c.

It seems to me that such a measure as is here recommended is very desirable. As

pointed out by Mr. Markham and Dr. Cleghorn, the gentleman who might be sent out might be profitably employed not only in studying and elucidating the various questions connected with the chinchona alkaloids, but in developing and turning to account the medicinal plants of the Neilgherries generally.

Secondly. That the Maillkhoondah plantation be restricted to 200 acres, and be used solely for propagating purposes.

As I entertain great doubts whether the Government operations for the raising of chinchona should be extended to Maillkhoondah at all, I should, of course, be in favour of restricting them as much as possible if a Government plantation is to be established there. But the question in regard to the formation of a Government chinchona plantation at Maillkhoondah has been referred to the Secretary of State, and we must await his orders.

Thirdly. That chinchona seeds and plants should be distributed gratuitously to all applicants.

I am quite opposed to this. The plants and seeds should be supplied, without reference to the number taken, at such a price as shall just remunerate Government. Government should not gain by their sale, but there is no reason why they should lose. Plants are now largely applied for at one anna apiece. If that be too high, it may be reduced to what will just cover the cost of rearing.

Fourthly. That efforts be made in a variety of ways to induce the natives to plant chinchona.

There can be no objection to this, but it is a measure which cannot be forced. The natives, it is to be hoped, will be brought gradually to feel the advantage of cultivating chinchona. But I fear it is not quite so simple an affair, nor one of such easy accomplishment as supposed by Mr. Markham.

Fifthly. That a person selected by Mr. Levinge, Collector of Madura, be sent at the Government expense to Ootacamund, there to receive instruction in the cultivation of chinchona, which he is afterwards to carry out on the Pulneys.

I am not in favour of this; the operations of Government in the cultivation of the chinchona should, in my opinion, be confined to the Neilgherries. There is no fear that the cultivation will not, in private hands, extend to all the hill ranges, nor is it at all necessary to interfere with its ordinary development.

Sixthly. That convicts be at once sent to the Neddiwuttum gaol.

When Government are satisfied that convicts can be securely guarded and well cared for at Neddiwuttum, and that convict labour will be as economical there as free, they may be sent. But these questions are now under investigation.

14 February 1866.

T. Pycroft.

Enclosure 6, in No. 85.

ORDER of the Madras Government.

1. ORDERED that the Principal Inspector General, Medical Department, be requested, with reference to paragraph 3 of the despatch of the Secretary of State, above recorded, to submit a list of the medical officers, whom, having regard to the qualifications mentioned in the despatch, he would recommend for appointment to the proposed commission. Dr. Shaw will also make such suggestions as occur to him, for ensuring a decisive trial of the relative and positive qualities, as febrifuges, of the Chinchona alkaloids other than quinine, specified in the despatch, and of the preparations, quinium, &c. alluded to by Mr. Markham.

2. The promised supply of alkaloids has not yet been received.

3. The Principal Inspector General, Medical Department, will be furnished with a copy of paragraphs 14 to 22 of Mr. Markham's Report, and of G. O., 20th ultimo, Revenue Department, No. 460.

4. With reference to paragraph 32 of Mr. Markham's Report, the Government consider it desirable that one uniform price should be charged for plants, whatever number may be taken. Under the present arrangement, a planter requiring say, 3,000 plants, gains by purchasing 5,000, and throwing away the surplus 2,000. Mr. McIvor will, therefore in future, charge one anna per plant in all cases. The Government do not concur with Mr. Markham as to the gratuitous distribution of seeds and plants, but wish to have Mr. McIvor's opinion on the subject. In submitting this, Mr. McIvor will state how many applications he has still on his registers, how he deals with applications (whether by priority of date, extent of requirement, or on what other principle), and how many of the 900,000 plants in his possession are in a fit state to send out to private applicants, possessing only ordinary skill and experience in horticulture. The Government consider that there is much truth in the remarks contained in the 58th paragraph of Mr. McIvor's last annual report, and apprehend that any such general distribution of delicate plants as Mr. Markham proposes would be unsuccessful. They wish to know when Mr. McIvor will be in a position to furnish well-grown plants in any considerable number.

5. The

5. The collectors of the districts marginally noted will offer such suggestions as occur to them on paragraphs 35 to 40 of Mr. Markham's report.
6. The deputy collector of Wynaad will be furnished with a copy of Mr. Howard's work on the Chinchona, and application will be made to the Secretary of State for a few more copies of the work. Copies of the Chinchona manual, with the annual additions thereto, have been extensively circulated, and Mr. Richardson doubtless has these; if he has not, copies will be sent to him.
7. Ordered, that a copy of Mr. Markham's reports be sent to the Government of Bombay, the Resident of Travancore and Cochin, the Commissioner for the territories of his Highness the Rajah of Mysore, and the Chief Commissioner Central Provinces, with the remark that the Governor in Council will be glad to afford them any assistance that may be desired in extending Chinchona culture.
8. The proceedings will be reported to the Secretary of State.

(signed) *J. D. Sim,*
Secretary to Government.

Enclosure 7, in No. 85.

From *W. G. McIvor*, Esq., Superintendent Government Chinchona Plantations, to
A. J. Arbuthnot, Esq., Chief Secretary to Government, Madras.

Sir,

Ootacamund, 8 July 1864.

1. I HAVE the honour to request you will be good enough to submit, for the consideration of Government, that for some time past great difficulty has been experienced in obtaining sufficient labour to perform the works connected with the Chinchona plantations, and as this difficulty is still increasing, I would respectfully solicit the favour of being furnished with about 500 prisoners, to be located on our plantations, making the principal station at Neddiwuttum. Here it would be necessary to build a temporary prison, a plan and estimate of which will be submitted after consultation with the inspector of prisons.
2. I understand that Chinese convicts can be procured from the Straits Settlements; these perhaps would be better suited to work in this climate than natives from the plains, and being generally good and careful cultivators, they will probably prove more useful.
3. Not only is the scarcity of labour severely felt and the cost enhanced, but the labourers now refuse to perform their ordinary tasks, and thus unless by the assistance of the prisoners, it will, I fear, be impossible to perform the operations of the present year within the estimated cost.
4. The Dodabetta plantations being situated within two miles at the farthest point from the native gaol of Ootacamund, here accommodation might be afforded for 100 prisoners appointed to work on these plantations.

From *J. Rohde*, Esq., Inspector General of Gaols, to *A. J. Arbuthnot*, Esq., Chief Secretary to Government.

Sir,

Ootacamund, 14 July 1864.

1. IN acknowledging your memorandum of the 9th July 1864, on Mr. McIvor's letter of the 8th idem., therein enclosed and now returned, I have the honour to state that I consider that officer's suggestion, as more fully detailed in his letter of the 12th instant, and memorandum therein enclosed, unobjectionable. I should be disposed to relax discipline in the case of prisoners so employed; but, if the full establishment of guards is to be maintained, I think it probable that the arrangements with the police may be a hindrance. As far as the Prisons Department is concerned there is no difficulty.
2. Mr. McIvor will provide suitable accommodation, his plans for which meet my approval.
3. I have said convicts from the gaol cannot conveniently work at the Dodabetta plantation; on this point Mr. McIvor is satisfied.
4. Mr. McIvor spoke to me about the Chinese convicts; I have already stated myself favourable to their employment in Government plantations (*see* proceedings of Government, 3d September last), and see no reason to change my views.

ORDER of the Madras Government, 3rd August 1864.

1. THE Governor in Council is of opinion that, with reference to the great scarcity of free labour on the Neilgherry Hills, the labour of convicts may with much advantage be made use of on the Chinchona plantations now in progress.
2. Mr. McIvor will submit, through the Inspector General of gaols, plans and estimates of the prisons he proposes to erect, providing accommodation for 500 persons to be employed

ployed on the plantations at Pycara, Neddiwuttum and Melkoondah. Mr. Rohde, when forwarding these plans, will state definitely and in detail the arrangements he would suggest for guarding the prisoners, maintaining discipline, &c.

(True Extract.)

(signed) *J. D. Sim,*
Secretary to Government.

To the Superintendent Government Chinchona Plantations,
To the Inspector General of Gaols.

From the Inspector General of Gaols, to the Chief Secretary to Government, Fort Saint George; Ootacamund, 11 November 1865.

I HAVE the honour to state, for your information and that of His Excellency the Governor in Council, that, on visiting the gaol on the Dodabetta Plantation, Mr. McIvor informed me that the Neddiwuttum Plantation Gaol would shortly be ready for its prisoners. I rode out with him, and inspected the building, which, though substantially nearly ready, was not in so forward a state of completeness as I supposed. I particularly requested Mr. McIvor to take measures to hasten the work, and get the building ready by the end of the month, as I should not like to move prisoners in the southern districts after the 20th or 25th of December, when cholera generally prevails.

2. I shall limit the gang in accordance with the Orders of Government, 5th September 1865, proportioning the numbers to the size of the building, at the ratio laid down for the Dodabetta Gaol, which it is like, though about treble the size.

3. Before I make arrangements for the transfer of prisoners to this and other plantation gaols, I must beg the Government to reconsider the whole question of the charge of the gangs, and that of the individual in whom the power of punishment, under Regulation X. of 1832, should be vested.

4. In my first letter, 13th August 1864, I suggested that powers of punishment of prisoners in the Dodabetta Plantation should, under Regulation X. of 1832, be vested in the ordinary course in the joint magistrate of Ootacamund; the question of superintendence I did not then enter on.

5. In my letter of the 19th May of the present year, I suggested that Mr. McIvor should have charge of the gang, with such special powers of punishment as, under the provisions of Regulation I. of 1833, the Government might confer on him; all offences which should not be summarily dealt with under those powers being exercised by the joint magistrate. The Government decided on vesting the powers of punishment under Regulation X. of 1832 in the joint magistrate, making no order in regard to charge and minor punishments.

6. Major Campbell met me previous to my seeing Mr. McIvor, and both urged that the power of punishment, with such limitation as to the Government should seem fit, should be vested in the officer in charge. Practical inconvenience and some irregularity has resulted from the present arrangement; and I think, with Major Campbell, that it is an objection that the prisoner is led to consider himself as a person of consequence when so much trouble has to be taken to ensure punishment for every misdemeanor on his part.

7. I have said irregularity has arisen under the present rule, alluding to written reports of the offences of prisoners signed by the gaoler being received in evidence. On viewing these reports of the gaoler, I found that they included a recommendation of the measure of punishment to be awarded. I desired that the evidence should in all cases be forwarded with the accused prisoner; but I mentioned to Mr. McIvor that I should suggest a change in the system, and this more especially as the Neddiwuttum prisoners could not in case of misconduct be sent in, and the distance to the Dodabetta Gaol and the inconvenience resulting from sending in prisoners for trial are greater than I anticipated even at the date of my letter of the 19th May 1865.

8. I would now suggest that Mr. McIvor be entrusted with powers of punishment under the provisions of Regulation I of 1833, as already suggested in my letter of the 19th May. I think Mr. McIvor is himself convinced that it would be sufficient that these powers need not be to the full extent provided by Regulation X. of 1832, and that it is the certainty and immediateness of punishment, and not its severity, that ensures respect. I would, therefore, suggest that he be authorised to punish to the extent of 40 lashes; any prisoners habitually subjecting themselves to severer punishment I should remove.

9. I do not consider it necessary to refer to the correspondence on this point; I enclose it in case you care to look into it, but it involves no point which I have not adverted to.

10. I found that the side rooms of the gaol were not occupied, under an idea that they were not secure, I have therefore not allowed for them in calculating the contents of the Neddiwuttum gaol, each room of which measures $72 \times 32 \times \frac{16 \times 23}{2} = 42524$ feet, or

83,048 feet in all, which divided by 564, the rate arbitrarily assumed in the Government Order (1241), gives accommodation for, say, 147 prisoners. My own opinion is that 200 might with equal safety be confined in the building, and the chances are that they would even then have, each, one-third more air than they had in the gaols from which they are transferred.

From the Superintendent of Government Chinchona Plantations, Ootacamund, to the Inspector General of Gaols; dated Ootacamund, 3 November 1865.

WITH reference to the Order of Government of the 21st October 1865, No. 1500, I have the honour to solicit the favour of your bringing to the notice of Government that serious inconvenience is likely to arise in consequence of my not being invested by Government, under Regulation I. of 1833, with the powers of punishment of prisoners under Regulation X. of 1832.

2. By the enclosed correspondence, you will observe that the joint magistrate of this station has directed that such prisoners as fail to perform their task be forwarded to his court for trial, together with the necessary witnesses to establish the charge. The Ootacamund Court being nearly $4\frac{1}{4}$ miles distant by the road, would involve the loss of the entire day's work of the convict, together with that of the witnesses, on every occasion on which it was necessary to inquire into the misbehaviour of any one convict. One police guard at present is barely sufficient to guard the men at work, and could not be spared to form this escort; while the prisoners, being aware that no one on the spot has any power over them, may produce serious outbreak.

3. I trust, therefore, that you may be pleased to move Government to confer on me the necessary powers of punishment over the prisoners confined in the Dodabetta, Neddiwuttum, and Mailkhondah Gaols.

4. I would also, with your approval, solicit permission to reward prisoners who performed work over and above the allotted task, to the full value of the extra work performed, either by giving to the prisoner an extra allowance of food, or money to be deposited on his account, and made over to him on his release, or that the extra work may be taken in reduction of his sentence, as he may select. This would place me in a position to offer a very great encouragement to the convicts, and might prove the means of teaching them the benefits and advantages to be derived from constant and diligent labour.

From the Joint Magistrate, Ootacamund, to the Superintendent Government Chinchona Plantations, in charge of Gaol, Dodabetta; dated Ooty, 31 October 1865, No. 124.

I HAD some conversation with Mr. Rohde to-day about the punishment of convicts in your gaol.

2. Mr. Rohde says it is absolutely necessary that convicts who misbehave appear at my Court, and that I should summarily investigate their cases. I beg, therefore, when occasion requires, you will be so good as to forward the individuals to my Court, with witnesses, as also your book, with particulars of the misbehaviour of the convicts, duly signed by you, as superintendent, when I shall be able to satisfy myself, and record any punishment that I may award in the book.

From the Superintendent, Government Chinchona Plantations, to the Joint Magistrate, Ootacamund; dated Ootacamund, 3 November 1865.

IN acknowledging your letter, No. 124, dated 31st ultimo, I have the honour to inform you that I am unable to find any Government Order placing me in charge of the Dodabetta Gaol or the convicts. It appears to have been an error my taking charge of the prisoners, except so far as regards working them, as without the power of enforcing obedience, it would be vain my endeavouring to maintain gaol discipline.

2. From the correspondence, it appears that the entire control of this prison is under you as joint magistrate; consequently, I have directed the gaoler in future, to apply to you for instructions in all matters connected with this prison.

3. The object in suggesting the construction of gaols on the Chinchona plantations was to provide a supply of labour at command at all seasons, and at a reasonable cost. To forward such convicts as failed to perform their task would, I fear, negative the results sought to be obtained, inasmuch as to get redress for the non-fulfilment of the daily task would render necessary the loss for an entire day's work, in attending and returning from your Court, of the convict or convicts accused, and of the necessary witnesses; while, in addition to this loss, my department would also have to bear the expense of the extra police guard necessary for this duty. I therefore hope that, under these circumstances (pending a reference to Government), you may be able to make it convenient to visit the gaol, and punish delinquents on the spot.

(True Copies).

(signed) *W. G. McIvor*,
Superintendent, Government Chinchona Plantations.

From the Superintendent of the Government Chinchona Plantations, Ootacamund, to the Chief Secretary to Government, Fort Saint George; Ootacamund, 16 November 1865.

I HAVE the honour to solicit the favour of your being so good as to bring to the notice of Government that serious inconvenience is experienced in working the convicts employed on the Dodabetta Chinchona plantation, in consequence of the prisoners having recently ascertained that there is no one on the spot with power to punish them.

2. On Monday the 13th instant, the whole of the convicts, with the exception of the Chinese, refused to perform their work, were highly insubordinate, and insulting to the overseer in charge of the gang. On Tuesday the 14th, this spirit became still more apparent; and on the 15th, we arranged to march the whole of the native prisoners to the court of the joint magistrate; but on applying to the police inspector for a sufficient guard for this purpose, it could not be supplied. Under these circumstances, the magistrate kindly visited the Dodabetta Gaol, and punished the less serious of the offenders on the spot, amounting to 56 in number, while 11 of the prisoners have been forwarded to the magistrate's court to-day, to be tried for more serious offences, such as criminal intimidation, &c.

3. The prisoners have hitherto been cheerful and contented, and willingly performed their work, but a few bad men having instigated the others, they combined to throw off all control. In attempting to send a few of the first offenders into the station, they immediately feigned sick and would not walk, but lay down on the road, one here and another there, so that the men who were walking on, and who had laid down, could not be guarded by the police.

* Court, Ooty, 4th November 1865.
"I return the letters sent, I fancy, for
y frank, as I am not authorised to
ank or in charge of Dodabetta Gaol,
ad I beg to inform you that, as it is
uite impossible for me, in my position
magistrate, to visit your gaol as you
quest, I have forwarded your letter,
o. 94, of 3rd November 1865, to Mr.
ohde."

4. On the 3rd instant, I had the honour to bring to the notice of the Inspector General of Gaols the inconvenience likely to arise in consequence of my not being invested, under Regulation I. of 1833, with the powers of punishment of prisoners under Regulation X. of 1832, and as the joint magistrate of this station states* it to be impossible for him to visit this gaol, or to take charge of it, I trust the Government may, therefore, be pleased to issue early orders on the subject of my letter above noted.

5. The subject of this letter I have communicated personally to Mr. Rohde, and understand from that gentleman that he has recommended me to have charge of the gaols on the Chinchona plantations, and be entrusted with some limited powers of punishment of prisoners, but that these powers should not amount to those in Regulation X. of 1832.

6. Should the Government consider it advisable to give me any charge of the prisoners, except in so far as working them, I respectfully submit that with this charge the full powers of punishment be conferred, as without such, any attempt to work the prisoners successfully on our plantations must, I fear, end in failure.

No. 23. From the Inspector General of Gaols, to the Chief Secretary to Government, Fort St. George; dated Ootacamund, 18 November 1865, No. 517.

In acknowledging the Order of Government of the 8th instant, No. 1589, relative to the arrangements for controlling the prisoners on the Chinchona plantations, I have the honour to state that my letter of the 11th idem will have anticipated the question. I am of opinion that, all things considered, it will be best to confer on Mr. McIvor the powers of punishment enacted by Regulation X. of 1832, as provided by Regulation I. of 1833. It will be for the Government to decide on the extent to which such powers shall be conferred. I do not anticipate any abuse, should full powers be conferred; but, should there be any objection to this, I consider that by limiting the extent of punishment to 36 stripes, there will be ample power; indeed, I do not generally consider that stripes in excess of 36 or 40 are so beneficial as the nominally milder punishment.

No. 24. ORDER thereon, 4 December 1865, No. 1724.

UNDER the provisions of Regulation I. of 1833, the Governor in Council directs that the Superintendent of the Government Chinchona plantations, in his capacity of superintendent of the gaol at Dodabetta, shall exercise the powers of punishment created by Regulation X. of 1832. The Inspector General will report to Government, at the expiration of six months, the number and nature of the punishments inflicted by Mr. McIvor, with such remarks, if any, as he may have to make upon the subject.

2. The Governor in Council does not deem it necessary to pass any orders with reference to the gaols which it is proposed to establish at Neddiwuttum and Mailkoondah, as those gaols are not yet completed. The Inspector General will apply to Government for sanction before taking any steps with reference to the transfer of prisoners to either of those gaols.

(True Extract.)

Chief Secretary.

To the Inspector General of Gaols.

From the Inspector General of Gaols, to the Chief Secretary to Government, Fort St. George; Ootacamund, 11 December 1865.

IN reference to the Order of Government, No. 1724, dated 4th instant, I have the honour to report that the Neddiwuttum Gaol building is now reported complete.

2. I must solicit early orders in regard to the transfer of the convicts, as I really do not know how to dispose of many in the southern gaols, and I am most anxious to move any gangs in the south before the usual season of epidemic disease.

ORDER of the Madras Government, 19 December 1865.

THE Governor in Council is not prepared to sanction the transfer of any prisoners to the Chinchona plantation at Neddiwuttum, until the experiment of employing convicts on the Dodabettah plantation has been fully tested.

2. The Inspector General will abstain from taking any steps in the matter until further orders.

From the Superintendent of the Government Chinchona Plantations, Ootacamund, to the Secretary to Government, Revenue Department, Fort Saint George; Ootacamund, 5 January 1866.

WITH reference to the Order of Government in the Judicial Department, dated 19th December 1865, No. 1813, I would most respectfully submit, for the consideration of Government, that, deferring the transfer of convicts to the Neddiwuttum Gaol, which is now completed and ready for their reception, will seriously retard the progress of this plantation.

2. The Government having approved* of the employment of convict labour on this plantation, and authorised the construction of a gaol for the reception of the prisoners, in order to complete this building, and secure to the plantation the advantages of the convict labour as speedily as possible, I employed many of the labourers, which might have been (and would, had no gaol been in course of erection) employed in preparing ground to enable us to plant out our nursery plants in the spring. Early in January, many of our free labourers will be leaving for their homes, upwards of 200 having already given notice to that effect, and those men will not return until the end of May or beginning of June, being in fact too late to prepare land for next planting season, I having depended on getting this work done by the convict labour during the months of January, February, and March; and if disappointed in this, it will form a very serious impediment to getting our nursery plants put out this season, while they will be too large to transplant the following season.

* G. O. dated 3 Aug. 1864, No. 1338.

3. With reference to the success which will attend the performance of heavy work on our plantations by convicts, there can, I submit, be no doubt, as what has already been done at Dodabettah fully establishes this; and I have no hesitation in saying that all future experience will establish that convicts can be employed on these plantations with advantage to the Government, and with satisfaction and benefit to themselves.

4. I have, for the last 25 years, been accustomed to the management and arrangement of labour, to the settlement of disputes arising among those employed under me, and so successful have I been in these matters as to procure a fair proportion of work, and to command labourers when others were unable to do so, thus establishing my arrangements to be satisfactory to the parties employed; and should any report contrary to this have reached the Government, I would esteem it a favour by being furnished with information respecting it, as I feel confident your Honourable Government will not allow any report, until fully investigated, to impede the progress of this national undertaking.

5. It is true that misconceptions arose among the prisoners when first located in the Dodabettah Gaol; but for this, I am in no way responsible, as I then had no control or influence over them. The prisoners thought that they could throw off all control with impunity, and dictate their own terms. In this they were instigated by prisoners (13), who were removed for doing so to the Lawrence Asylum Works, but prior to their removal were sentenced by the magistrate, Major Campbell, to 60 lashes each; but this punishment was not inflicted, being remitted on the recommendation of the officer in charge of the asylum gaol. This may have had a bad effect on our prisoners, by leading them to conceive that by giving trouble they could be removed, and evade punishment for any misconduct in this gaol.

6. With prisoners, it is natural to suppose that there will be some trouble in managing them, and, occasionally, hardened offenders must be punished, although generally the certainty of immediate punishment prevents its infliction; however, all that has taken place in the Dodabettah Gaol is unimportant, when compared with the disturbances and escapes at the Kaundle and Lawrence Asylum Gaols. Now that the prisoners on the

Dodabettah

Dodbettah plantation are accustomed to their work, they are contented, cheerful, and perform, on an average, quarter to half more than their daily task, for which they receive extra indulgences.

7. The police guard are afraid of the Chinese prisoners, and misconceptions arise because they do not understand their language, and as we have at present a large number of Chinese in proportion to the native convicts, intending to train one-half of the Chinese at Dodabettah, and remove them to the Neddiwuttum gaol immediately it was completed.

8. Under the circumstances above noticed, I beg most respectfully to solicit the favour of Government being pleased to reconsider their order, as it would be conferring a great benefit, not only to the plantations, but evidently to the Inspector General of Gaols, to allow the transfer of convicts to Neddiwuttum, inasmuch as that officer has so many in the southern prisons that he does not know how to dispose of them.

ORDER of the Madras Government, 20 January 1866.

BEFORE passing final orders on the foregoing letter, the Governor in Council directs that the Inspector General of Gaols will submit to Government, with as little delay as possible, a detailed estimate of all the additional charges which will have to be incurred in guarding, feeding, and clothing, and for medical attendance to the prisoners whom it is proposed to locate in the gaol which has been erected on the chinchona plantation at Neddiwuttum. The Estimate should be prepared in communication with Captain Drever, the Deputy Inspector General of Police for the division, the Inspector General of Police being at present at too great a distance to be communicated with, without considerable delay, and with the medical officer in charge of the Lawrence Asylum gangs. It should include the salary of a competent European superintendent, to be employed exclusively on this particular duty, and of a medical subordinate. All extra charges entailed by the location of the prisoners at Neddiwuttum will have to be met from the Chinchona Estimate.

From the Inspector General of Gaols to the Chief Secretary to Government, Fort Saint George; Ootacamund, 29 January 1866.

In reference to the Order of Government, 20th January 1866, No. 86, relative to the employment of convicts on the Neddiwuttum plantations, and to the direction that a superintendent, to be employed exclusively on this work, be charged in the Estimate, I have the honour to state that this condition, if taken literally, seems to me a bar to the adoption of the plan, as I could hardly expect any superintendent, with the necessary qualifications, and wholly confined to the duty, to serve for a moderate salary.

2. I think that by an arrangement I have suggested to Mr. McIvor, and to which he assents, the difficulty may be overcome, namely, by removing Mr. Charles Dawson to Neddiwuttum as Mr. McIvor's assistant, both in regard to the plantation and convicts, and giving him powers, under Rule 1 of 1832, in Mr. McIvor's absence.

3. I have seen Captain Drever, and await his estimates. Dr. Miller has been engaged day and night in some bad cases, and I have hitherto missed seeing him.

4. All I now wish to know, is, whether the Government would, in reference to what I have suggested, insist on a superintendent wholly employed on the duty being provided?

P.S.—I have since seen Dr. Miller. He thinks my proposal that Mr. Beckett, now at Vellore, should be offered the medical charge, a good one. He has confidence in Mr. Beckett, and I could entrust him with the duties of gaoler also. Under any circumstances, Dr. Miller thinks it necessary that an apothecary, and not a dresser, should be in charge, instancing the failure at Lovedale till the dresser was superseded. He thinks a staff allowance of, say, 50 rupees, should be given for the duty. Dr. Miller will, if possible, accompany me to the gaol at Neddiwuttum, this week or early next week.

ORDER of the Madras Government, 6 February 1866.

THE Governor in Council desires that the Inspector General of Gaols will state explicitly whether he considers Mr. Dawson to be a fit person for the superintendence of convicts. Mr. Dawson's age should be stated.

2. Mr. Rohde should submit the rest of the information called for in the Proceedings of Government of the 20th ultimo, with as little delay as possible.

To the Inspector General of Gaols.

(signed) *A. J. Arbuthnot*,
Chief Secretary.

MINUTE by the Honourable the President.

A PROPOSITION was made by Mr. Rohde, I think, to give the charge of the prisoners at Neddiwuttum to Mr. Dawson, and I have since heard from Mr. McIvor that he is disposed to place Mr. Dawson in charge of the plantation at Neddiwuttum, as Captain Nicholls is not qualified to have charge.

2. This would remove the difficulty about the charge of the convicts, as Mr. Dawson might have powers given to him similar to those now conferred on Mr. McIvor as regards the Dodabetta convicts. Mr. Dawson might have 50 rupees extra per month as superintendent of the gaol, or whatever his designation would be. This arrangement would, I think, suit all parties; the Government would get its gaols emptied, and its Chinchona plantations cultivated, at small cost, by labour upon which dependence could be placed.

3. Mr. McIvor would get his labour cheap, and would only have to pay 50 rupees per month, instead of 500, for superintendence. It would be as well to press the matter forward, as the season is advancing, and the trees are to be barked next month.

(signed) *W. T. Denison.*

MINUTE by the Honourable *T. Pycroft.*

WE must get Mr. Rohde's reply to the reference made to him, not only regarding Mr. Dawson, but on the other points connected with the proposed employment of convicts at Neddiwuttum.

(signed) *T. Pycroft.*

MINUTE by the Honourable *H. D. Phillips.*

I WOULD wait for Mr. Rohde's reply to the several points arising out of the proposed transfer to Neddiwuttum. The cost of the police guard will be rather a large item in the monthly bill.

(signed) *H. D. Phillips.*

From the Superintendent, Government Chinchona Plantations, Ootacamund, to the Secretary to Government, Revenue Department, Fort Saint George; dated Madras, 19 February 1866.

I HAVE the honour to inform you of my intention to return to Ootacamund on the 21st instant, when I shall place Mr. Charles Dawson in charge of the Chinchona plantation at Neddiwuttum, as I consider him well qualified to take charge of the convicts when employed on this plantation.

2. Mr. Dawson has now been employed on the plantation for upwards of two years, and has shown considerable judgment in the management of his labourers, and I feel confident that, under my direction, his management of the prisoners will prove satisfactory to the Government.

ORDER of the Madras Government, 20 February 1866.

THE appointment of Mr. Dawson to the charge of the Neddiwuttum plantation is approved.

(signed) *J. D. Sim, Secretary to Government.*

From the Inspector General of Gaols to the Chief Secretary to Government, Fort Saint George; Ootacamund, 10 February 1866.

I HAVE the honour, in reference to the Order of Government of the 6th instant, to state, that had I not considered Mr. Dawson qualified for the charge of convicts in the Neddiwuttum Gaol, I should not have recommended him; that Mr. Charles Dawson is, Mr. McIvor states, 25 years of age, and that I consider him qualified.

2. I think he will require Mr. McIvor's assistance in regard to supplies, &c.; as, stationed as he would be at Neddiwuttum, he could not make the arrangements conveniently.

3. As Mr. McIvor is the person most interested on behalf of the Government, I think the arrangement I proposed the proper one.

4. Captain Drever has been prevented from going out to see the gaol and locality; but my last note from him mentioned that he was going yesterday. On receipt of his reply, I will submit full particulars of cost, &c.

ORDER of the Madras Government, 21 February 1866.

LIEUTENANT Colonel Wilson having been appointed Inspector General of Gaols, the Governor in Council directs that he will proceed to Ootacamund, with as little delay as possible, and arrange, in communication with Captain Drever, Mr. McIvor, and Dr. Miller, for the immediate transfer to the gaol at Neddiwuttum of such number of convicts as can be accommodated in it, should he find that the arrangement can be carried out at a comparatively moderate cost. It is observed that Mr. Dawson is considered by Mr. Rohde to be duly qualified for the superintendence of convicts. Lieutenant Colonel Wilson will report the arrangements made, their cost, &c.

To the Revenue Department.

To Lieut. Colonel W. J. Wilson, Inspector General of Gaols.

From the Inspector General of Gaols, to the Chief Secretary to Government, Fort Saint George; Ootacamund, 20 February 1866.

I HAVE now the honour to forward Captain Drever's Report on the requirements for the police at the gaol at Neddiwuttum.

2. From Captain Drever's statement it would appear that 491 rupees monthly would be the expense of guarding the 160 convicts, while taking the bills from the low country police stations 238 rupees would be the charge if the prisoners remained at the district gaols; this latter amount, however, does not include the pay of a European inspector (115 rupees).

3. In Mr. McIvor's absence, I cannot authoritatively state the difference in cost of diet at Neddiwuttum as contrasted with the cost at the gaols from which the prisoners would be drawn; but assuming that the prices demanded from Major Farewell were correct and incapable of reduction, the contract price would amount to 3 annas a head a day, or, for 160 prisoners, 30 rupees daily, or 900 to 930 rupees monthly, or Rs. 5. 10. 0. per man per month; while on the present dietary at Salem, Rs. 3. 7. 11. is the average monthly cost per head; and at Coimbatore the contract price already is the same as I anticipate at Neddiwuttum. In clothing and bedding the hill rate would exceed that of the plains according to the price of cumblies on data in my office; I should assume this difference at 11 rupees per head per mensem.

4. I do not anticipate any serious increase in other items of consumption; firewood, which is paid for in other gaols, will be here furnished free of cost.

5. In regard to the prison's establishment, I cannot assume any rate for the salary of an officer specially in charge, nor do I think this outlay will, under the arrangement I have proposed, be necessary.

6. Assuming that the duties of gaoler and medical attendant may be combined in one individual, I should propose 100 rupees monthly as the staff salary for the double duty.

7. The establishment other than superintendent would consist of nine warders, including one head warder; their pay would amount to 94 rupees per mensem, and I suppose 7 rupees each per annum for warm clothing.

8. Buildings to be erected would, I presume, be available for garden purposes, and the cost would be borne wholly by the gardens.

9. The account then, exclusive of buildings, would stand thus—

Annually.	Actual Cost at Coimbatore.	Probable Cost at Neddiwuttum.
	<i>Rs. a. p.</i>	<i>Rs. a. p.</i>
Full diet for one prisoner, at 3 annas per day - -	68 7 -	68 7 -
Clothing - - - - -	4 3 3	11 - -
Lighting stands included in the cost of diet - -	-	-
Transfer, including batta on release, to and fro, say 5 rupees, distributed over two years - - -	- 8 -	2 8 -
Superintendence and medical attendance - - -	- - -	1,200 - -
Establishment of one head warder at 14 rupees, and eight warders at 10 rupees each per mensem - -	- - -	1,128 - -
*Police guards, including European superintendence -	†238 - -	491 - -

* I omit this, as I do not know if Government think a European inspector necessary.

† This does not include the pay of a European inspector.

(signed)

J. R.

From the Deputy Inspector General of Police, Western Range, to the Inspector General of Gaols, Ootacamund; dated Ootacamund, 12 February 1866, No. 21.

WITH reference to G. O., No. 86 of 20th January 1866, I have the honour to inform you that I visited the proposed gaol at Neddiwuttum on the 10th instant.

2. I find four ranges of huts, sub-divided into four rooms (8' x 7'), have been run up for the accommodation of the police, each room to contain two men.

3. Five more ranges will be required, viz., three similar to those already constructed, and two, sub-divided into two rooms each, for petty officers.

4. I cannot put two men into places of this kind even as a temporary arrangement, and if this gaol is to be permanent, very superior accommodation, even to what I have proposed, must be provided for the guards, as well as their inspector.

5. If 160 convicts are sent to this gaol, the guard will be as follows:

1 European Inspector	-	- Rupees	115 monthly.
2 Head Constables,	at 27	"	54 "
2 Deputy Constables,	at 16·8	"	33 "
9 1st Class Constables,	at 11	"	99 "
19 2nd Class Constables,	at 10	"	190 "

or, a total of 33 police officers, at a monthly cost of 491 rupees.

6. I failed to see that there was any safe or convenient accommodation ready for the convicts to cook in. I merely mention this lest it may have escaped your notice.

ORDER of the Madras Government, 24 February 1866.

It is observed that Lieutenant Colonel Wilson has been instructed in the Order of Government of the 21st instant, No. 249, to arrange for the immediate transfer to the gaol at Neddiwuttum of such number of convicts as can be accommodated in it, should he find that the arrangement can be carried out at a comparatively moderate cost.

Chief Secretary.

To the Inspector General of Gaols.
" " " of Police.
" Revenue Department.

— No. 86. —

From the Secretary of State for India to the Governor of Madras in Council.

My Lord,

India Office, June 1866.

Para. 1. I HAVE considered in Council the letters in the Revenue Department, noted in the margin,* forwarding various reports and proceedings relating to the progress of chinchona cultivation in your Presidency, together with the letter dated 13th March (No. 6) 1866, submitting your proceedings consequent on Sir C. Wood's despatch of the 30th September (No. 27) 1865, and on the report furnished by Mr. Markham after his visit to the chinchona plantations at the commencement of the present year.

* No. 55,	dated	24 August	1865.
No. 59	"	23 Sept.	"
No. 65	"	26 Oct.	"
No. 68	"	13 Nov.	"
No. 70	"	27 Nov.	"
No. 74	"	25 Dec.	"
No. 75	"	25 Dec.	"
No. 4	"	6 Feb.	1866.
No. 5	"	10 March	"
No. 13	"	11 April	"
No. 16	"	24 April	"

2. It is highly gratifying to me to find that the favourable reports from time to time submitted by Mr. McIvor as to the progress of the plantations are fully confirmed by Mr. Markham, and I gladly recognise the skill and energy on the part of Mr. McIvor which have conduced so materially to this result.

3. With regard to the future management of the Government plantations, and the extension of chinchona cultivation throughout the hill districts of your Presidency, I concur in the opinion of your Government as to the manner in which you propose to deal with the plantations of Neddiwuttum, Pykarah, and Dodabet. As regards the Mailkoondah plantation, as to the maintenance of which you solicit my instructions, I am of opinion that operations should, at least for the present, be continued there on the part of Government. The site is reported by Mr. Markham to be peculiarly well suited for the cultivation of the chinchona. If it should be decided eventually to dispose of it, there can be little doubt that any expenditure which may be incurred on it will be

reimbursed; and, although it may be hoped that private enterprise may hereafter render the continuance of operations by Government on an extended scale unnecessary, it is impossible at present to regard as settled the question as to the extent to which Government may see fit to take part in the undertaking. The amount of land specified in para. 5 of your letter should therefore be retained for the present at Maikondah, the remainder being sold as proposed by you.

4. In order, however, to carry out as fully as possible the great object contemplated by Her Majesty's Government in introducing the chinchona into India, viz., that of making its produce accessible to the greatest possible number of the poorer inhabitants of the country, it is evident that every effort should be made to promote the cultivation of the tree by private persons in all the localities where the cultivation is likely to be successful. It is gratifying to observe the readiness with which planters, both European and native, are disposed to undertake the growth of the chinchona plant, in many cases in connection with coffee plantations; but I am of opinion that the greatest benefit would result, and that one of the most effectual methods of diffusing among the bulk of the community the benefits which the introduction of the chinchona is calculated to produce, would be secured should it be found practicable to promote the cultivation of the tree by villagers and small holders of land in suitable situations, even if they should not be able to do more than plant a few trees around their houses. The agency of the officers of Government of different ranks, who would make known the uses of the bark, and through whom the young plants might be distributed, would, of course be indispensable to the carrying out of this plan; and I am of opinion that every encouragement should be given to those officers who, like Mr. Levinge and Mr. Ballard, show an interest in the matter, and a desire to assist in spreading the cultivation.

5. I agree with your Government that it is not expedient that Government should undertake the maintenance of any plantations in addition to those which it has already established, and I further agree in your decision that in all cases where the cultivation of the chinchona is undertaken for the purposes of trade or profit, a charge should be made for the plants set up from the Government plantations; but in all cases, whenever a Government officer sees an opportunity of introducing the cultivation among the lower classes in his district, a supply of plants should be furnished to him for gratuitous distribution, and every other practicable assistance afforded in the prosecution of the work.

6. I concur in the opinion of your Government, that it is expedient at this stage of the undertaking, that an experienced chemist and analyzer, possessed of a thorough knowledge of the chinchona and its products, should be appointed to investigate on the spot various points connected with the cultivation of the tree and the extraction and use of its alkaloids, without a determination of which a satisfactory decision cannot be passed on various questions now awaiting solution. The establishment of a manufactory of quinine and of the inferior products of the chinchona is the most important of these questions, and this cannot evidently be disposed of without further inquiry. I have, accordingly, resolved to sanction the appointment of an analytical chemist for a term of three years, and I shall lose no time in obtaining the services of a thoroughly qualified individual to proceed to your Presidency at as early a period as possible.

7. I approve the measures proposed to be taken by you for obtaining satisfactory reports on the relative efficiency of the various products of the chinchona bark proposed by Mr. Howard, and recently sent out to your Presidency.

8. Three copies of Mr. Howard's work will be transmitted to your Government, in accordance with the request contained in the 7th paragraph of your letter, No. 6, of the 13th March last.

I have, &c.

(signed) *De Grey and Ripon.*

— No. 87. —

From the Government of Madras to the Secretary of State for India.

Madras, 22 May 1866.

WE have the honour to forward for your information the accompanying Tabular Report on the number, condition, &c., of the Chinchona plants on the Neilgherries on the 30th April 1866.

Enclosure in No. 87.

REPORT on the Number, Distribution, and Condition of Chinchona Plants on the Neilgherries, on the 30th April 1866.

No. of Species.	Botanical Names.	Commercial Names.	Number of Plants.	Value per Lb. of Dry Bark in the London Market..		REMARKS.
				s.	d.	
1	<i>C. succirubra</i> - -	Red Bark - -	297,465	2	6 to 8	The weather being favourable planting operations have commenced. The number of plants planted out during the month being 1,819, making the total number permanently planted out 246,690.
2	<i>C. Calisaya</i> , var. <i>Frutex</i>	Yellow Bark - -	37,481	2	10 to 7	
3	" " <i>Vera</i>					
	<i>C. officinalis</i> , var. <i>Condaminea</i> (<i>C. Uritus-singa</i>).	Original Loxa Bark	608	2	10 to 7	
4	<i>C. officinalis</i> , var. <i>Bonplandiana</i> (<i>C. Chahuarguera</i>).	Select Crown Bark -	753,272	2	10 to 7	The increase by propagation is 54,272, being 3,934 under the average of the last six months, making the total number of plants 1,123,645.
5	<i>C. crespilla</i> - -	Fine Crown Bark -	4,380	2	10 to 6	
6	<i>C. lancifolia</i> - -	Pitayo Bark - -	198	1	8 to 2	
7	<i>C. nitida</i> - -	Genuine Grey Bark	2,786	1	8 to 2	
8	<i>C. Species</i> without name.	Fine Grey Bark -	8,500	1	8 to 2	
9	<i>C. micrantha</i> - -	Grey Bark - -	15,141	1	8 to 2	
10	<i>C. Peruviana</i> - -	Finest Grey Bark -	3,389	1	8 to 2	
11	<i>C. Pahudiana</i> - -	Unknown - -	425	Unknown.		
TOTAL Number of Plants - - -			1,123,645			

TABLE II.

MEMORANDUM of the Growth of Eleven Plants of *C. succirubra*, planted on the Second Denison Plantation at Neddivuttum, on 30 August 1862.

Number of Plants.	Height in Inches when Planted, 30 August 1862.	Height in Inches on 31 March 1866.	Height in Inches on 30 April 1866.	Growth in Inches during April 1866.	By whom Planted.
1	23	134	136 $\frac{3}{4}$	2 $\frac{1}{4}$	His Excellency Sir W. Denison.
2	16 $\frac{1}{2}$	119 $\frac{1}{2}$	119 $\frac{1}{2}$	-	
3	19	122 $\frac{1}{4}$	123	$\frac{3}{4}$	
4	15	111 $\frac{1}{4}$	111 $\frac{1}{4}$	-	
5	27	138	141 $\frac{1}{2}$	3 $\frac{1}{2}$	
6	20	109	109	-	J. W. Breeks, Esq.
7	20	124 $\frac{1}{4}$	124 $\frac{1}{4}$	-	
8	18	125 $\frac{1}{2}$	126 $\frac{1}{2}$	1	Dr. Sanderson.
9	20	130 $\frac{3}{4}$	131	$\frac{1}{4}$	J. D. Sim, Esq.
10	20	133 $\frac{1}{2}$	134 $\frac{1}{4}$	$\frac{1}{4}$	Lieutenant McLeod.
11	18	114 $\frac{1}{2}$	116	1 $\frac{1}{2}$	P. Grant, Esq.
12	-	83	83	-	Plant cut down for bark.

TABLE II. exhibits the growth of 11 plants of *Chinchona succirubra*, planted out by his Excellency the Governor, and other gentlemen, at Neddivuttum, on the 30th August 1862. The average growth of these plants during the month is about one inch, or half an inch above the average growth of last month.

One of the two plants cut down on the 20th of March 1863 for the bark, submitted to Mr. Howard for analysis, has made strong shoots of 83 inches in height.

TABLE III.

SHOWING the Height of Twelve Plants of *C. officinalis*, planted on the Dodabétta Plantation at Ootacamund, on the 30th September 1863.

Number of Plants.	Height in Inches when Planted, 30 September 1863.	Height in Inches on 31 March 1866.	Height in Inches on 30 April 1866.	Growth in Inches during April 1866.	REMARKS.
1	19	111½	114	2½	The 12 plants of <i>C. officinalis</i> (a shrubby species) on the Dodabétta plantation, gives an average growth of about 2½ inches, or ¾ of an inch above the growth of last month. Several plants of <i>C. succirubra</i> and <i>Calisaya</i> have furnished a good supply of fine seeds, which are now germinating freely.
2	14½	98½	101	2½	
3	28	113½	116½	3	
4	22	108½	112	3½	
5	21½	116	118½	2½	
6	28	124½	125	½	
7	22½	107½	110½	3	
8	21½	108	110½	2½	
9	21½	119½	121½	2	
10	19½	112	115	3	
11	24	115	118½	3½	
12	24	115½	118	2½	

TABLE IV.

REGISTER of Chinchona Plants Distributed.

NAMES.	STATIONS.	Number of Plants.
Mr. F. N. Maltby - - -	Travancore - -	16
Dr. Junghuhn - - -	Java - - -	56
Mr. A. R. Lascelles - - -	Ootacamund - -	12
Mr. M. Anderson - - -	Jamaica - - -	2
Dr. Wiche - - -	Bombay - - -	10
Dr. T. Anderson - - -	Calcutta - - -	554
Dr. Jamieson - - -	Saharanpore - -	107
Professor Lees - - -	Calcutta - - -	547
Rajah of Travancore - - -	Travancore - -	521
Major Morgan - - -	Ootacamund - -	1,534
Mr. E. T. Fitzgerald - - -	Calcutta - - -	558
Mr. J. W. B. Money - - -	ditto - - -	1,369
Mr. W. Bourne - - -	ditto - - -	532
Captain Cox - - -	Wynad - - -	6
Mr. Hollock - - -	ditto - - -	2
Mr. T. Sheffield - - -	Ootacamund - -	12
Dr. F. Day - - -	Cochin - - -	100
Mr. Brown - - -	Tellicherry - -	12
Mr. J. Hall - - -	Ootacamund - -	156
Mr. T. Knop - - -	ditto - - -	18
Captain Lees - - -	Bengal - - -	386
Mr. W. H. Rayne - - -	Manantoddy - -	424
Rev. — Sawyer - - -	Ootacamund - -	1,018
Mr. Frend - - -	ditto - - -	512

The number of plants issued to the public during the month is 16,706, making the total number of plants distributed 100,688.

TABLE IV.—Register of Chinchona Plants Distributed—*continued*.

NAMES.	STATIONS.	Number of Plants.	REMARKS.
Mr. Hollock - - - -	Ootacamund - -	1	
Mr. J. Pierie - - - -	Seegoor - - -	12	
Colonel Scott - - - -	Ootacamund - -	1,236	
Mr. Berend - - - -	Cachar - - -	275	
Rev. J. Hunter - - - -	Coonoor - - -	12	
Mr. J. Mullaly - - - -	ditto - - -	160	
Mr. W. H. Stanes - - - -	ditto - - -	1,262	
Colonel R. Cooper - - - -	Kotagherry - -	12	
Mr. F. Cockburn - - - -	ditto - - -	12	
Colonel Woodfall - - - -	Coonoor - - -	12	
Mr. C. Anderson - - - -	ditto - - -	24	
Colonel Angelo - - - -	Ootacamund - -	12	
Rev. E. Laseron - - - -	ditto - - -	12	
Captain R. N. Taylor - - - -	Coorg - - -	96	
Major W. Agnew - - - -	Assam - - -	139	
Mr. V. H. Levinge - - - -	Madura - - -	12	
Chief Commissioner of - - - -	Nagpore - - -	28	
Mr. Fletcher - - - -	Ootacamund - -	24	
Gool Mahomed - - - -	ditto - - -	20	
General M'Cleverty - - - -	New Zealand - -	23	
Mr. W. Robinson - - - -	Kotagherry - -	330	
Mr. Crake - - - -	Wynad - - -	12	
Mr. H. R. Dawson - - - -	Seegoor - - -	12	
Captain Mann - - - -	Coorg - - -	48	
Mr. E. Roberts - - - -	ditto - - -	530	
Mr. H. Russell - - - -	Wynad - - -	52	
Rev. — Wait - - - -	Coonoor - - -	2	
Collector of Belgaum - - - -	Belgaum - - -	28	
Collector of Honore - - - -	Honore - - -	28	
Dr. Ross - - - -	ditto - - -	15	
His Excellency the Governor - - - -	Bombay - - -	158	
Mr. H. Hinde - - - -	Wynad - - -	12	
Mr. E. B. Thomas - - - -	Coonoor - - -	74	
Rajah of Poonganoor - - - -	Poonganoor - -	12	
Major Grant - - - -	Wellington - -	226	
Messrs. Thomson, Shaw & Co. - - - -	Poonganoor - -	28	
Mr. J. H. Trinson - - - -	ditto - - -	31	
Dr. Muller - - - -	Melbourne - -	28	
Mr. Tyrrell - - - -	Mysore - - -	12	
Dr. Sayers - - - -	Vellore - - -	12	
Major C. P. Taylor - - - -	Ootacamund - -	5,250	
Dr. Wilson - - - -	ditto - - -	6	
Mr. Schnarrie - - - -	ditto - - -	15,000	
Captain Fuller - - - -	Coonoor - - -	417	
Dr. Drummond - - - -	Ootacamund - -	224	
Captain Jennings - - - -	ditto - - -	1,756	
Lieut. H. B. Montmorency - - - -	Bangalore - -	6	
Mr. M'Hutchin - - - -	Ootacamund - -	3	
Colonel Molesworth - - - -	ditto - - -	6	
Mr. C. Gray - - - -	Coonoor - - -	12	
Mr. H. B. Leddell - - - -	Ootacamund - -	12	
Mr. Minchin - - - -	Wynad - - -	1,600	
His Excellency the Governor - - - -	Vizagapatam - -	35	
Mr. R. F. Phillips - - - -	Kotagherry - -	1,117	
Colonel Cooke - - - -	ditto - - -	24	
Mr. G. J. Glasson - - - -	Wynad - - -	1,000	
Dr. Macpherson - - - -	Mercara - - -	400	
Mr. W. H. Kerr - - - -	Coorg - - -	3,100	
Mr. James - - - -	Ootacamund - -	1,000	

TABLE IV.—Register of Chinchona Plants Distributed—*continued.*

NAMES.	STATIONS.	Number of Plants.	REMARKS.
Colonel Whish - - - -	Bengal - - -	82	
Mr. K. Mair - - - -	Calcutta - - -	1,180	
Mr. W. Shakespear - - - -	ditto - - -	61	
Mr. E. E. Meakin - - - -	ditto - - -	168	
Mr. C. Ackland - - - -	ditto - - -	150	
Mr. K. M'Iver - - - -	ditto - - -	124	
Mr. Havelock - - - -	Ootacamund - - -	12	
Mr. H. de Facien - - - -	Kartairy - - -	6,821	
Major Sweet - - - -	ditto - - -	910	
Captain Campbell - - - -	Bangalore - - -	6	
Royal Gardens - - - -	Mauritius - - -	36	
Honourable W. R. Arbuthnot - - - -	Wynad - - -	93	
Mr. H. Maxwell - - - -	Bombay - - -	50	
Mrs. C. Smith - - - -	Wynad - - -	316	
Captain Beckley - - - -	Wellington - - -	200	
Mr. Walsh - - - -	Salem - - -	100	
His Excellency the Governor General - - - -	Java - - -	175	
Captain Richardson - - - -	Kulhatty - - -	509	
Rajah of Poonganoor - - - -	Poonganoor - - -	24	
His Excellency the Governor - - - -	Madras - - -	24	
Mr. J. W. B. Money - - - -	Ootacamund - - -	25,000	
Captain Mitcheson - - - -	ditto - - -	50	
Mr. R. H. Elliot - - - -	Munjerabad - - -	157	
His Excellency the Governor General - - - -	Goa - - -	252	
Colonel Playre - - - -	Rangoon - - -	152	
Mr. Ryall - - - -	Kotagherry - - -	24	
Mr. J. Gordon - - - -	Coonoor - - -	1,701	
Mr. J. Rohde - - - -	Neddivuttum - - -	11,689	
Mr. J. Higginbotham - - - -	Goodaloor - - -	12	
Mr. S. Pitol - - - -	Mauritius - - -	36	
Mr. J. Horne - - - -	ditto - - -	36	
M. Edouard Cremary - - - -	Reunion - - -	51	
For the French Government - - - -	Algiers - - -	45	
Mr. J. B. Norton - - - -	Shevaroy - - -	50	
Mr. Mackay - - - -	Punjab - - -	50	
Mr. W. Forsyth - - - -	Central Provinces - - -	169	
Colonel Cadell - - - -	Coorg - - -	62	
Mr. J. L. Browning - - - -	Wynad - - -	4	
Mr. H. Leeds - - - -	Burmah - - -	112	
Maloo Sait - - - -	ditto - - -	6	
Mr. A. D. Brown - - - -	Dimhatty - - -	53	
Mr. J. C. Misquith - - - -	Ootacamund - - -	300	
Mr. J. L. Transsen - - - -	Coonoor - - -	8	
Captain Fitzgerald - - - -	Calcutta - - -	150	
Mr. J. Macpherson - - - -	Ootacamund - - -	12	
Major Travers - - - -	ditto - - -	5,000	
TOTAL Number of Plants - - -		100,688	

Ootacamund,
11 May 1866.

(signed) *W. G. McIvor*,
Superintendent, Government Chinchona Plantations.

— No. 88. —

REPORTS on the Wood of *Chinchona succirubra*.

From Mr. *Robert Fauntleroy* to Dr. *Forbes Watson*.

7 April 1863.

I DULY received your favour of the 2nd, and also the specimen of *Chinchona* wood.

You would have heard from me sooner, had I not wished to lay the block before some of the workers in woods who frequent this yard.

No one has taken to it yet: the fact is the wood is too tender for turnery purposes; and, judging from the small size and defective growth, is not likely to be found of a size sufficiently large for mechanical or furniture purposes. (The proper term in our trade is "cabinet" purposes, but my word, furniture, appears appropriate.) One man says, "It would do as well as pear tree for patterns, only it is likely to be much smaller in the plank."

I will keep you informed of fresh opinions as they turn up, meantime the block lies before me daily, so as to be kept in mind.

From Messrs. *Churchill & Sim* to Dr. *Forbes Watson*.

24 April 1863.

WE beg to acknowledge receipt of your favour of the 22nd instant, advising transmission of *Chinchona* wood, and requesting our opinion as to its commercial value for furniture, mechanical or other purposes, in this market.

Upon careful examination we find the insignificant bulk of this sample diminished by half consisting of sap, and it has neither the figure, grain, or hardness which gives wood value for constructive or decorative purposes.

Independent of the difficulty experienced in the introduction of a new foreign hardwood to the trade, the quantity and quality of those well known satisfy all demands, and the importation of new woods, even of a high character, is generally attended with loss.

Native-grown English timber, and Norway timber, from its proximity, enable consumers to have more than enough of cheap wood at prices which would be less than the freight from South America; and the appearance of the *Chinchona* tree does not indicate much more than fitness for firewood or the lowest uses.

— No. 89. —

From the Secretary of State for India to the Government of Madras.

My Lord,

India Office, 1 August 1866.

1. IN the despatch of my predecessor, dated 16th June 1866, you were apprised of his decision, that the operations at the Stanley Chinchona plantation in the Koondah hills should be continued.

2. These operations will necessitate the construction of a road from Ootacamund to the plantation, and I observe from your despatch, dated 13th March 1866, that it is your intention to have a good road made to the Koondahs as speedily as possible. This road will be useful to the private individuals who may open plantations on the Koondah hills, as well as to the Government. I would suggest that your attention should also be directed to the question of making an inexpensive bullock track from some point near the Stanley plantation to the low country, which might have the effect of bringing up supplies of provisions and labour from the Bowany valley and the Malabar districts in the direction of Manar. Such a means of communication would apparently have the effect of cheapening and facilitating all planting operations in the Koondah hills. Colonel Ouchterlony, in his Survey Report, speaks of these hills as likely hereafter to form one of the most valuable and important districts in the Madras Presidency.

3. It appears from your proceedings in this department that a new carriage road up the Coonoor Ghaut is in course of construction, at an estimated cost of upwards of two lacs of rupees, including the expense of preliminary surveys and of making the trace; as well as a road down the Goodaloor Ghaut, and a new road over the Neilgherry plateau, from Ootacamund to Neddiwuttum.

4. The new Coonoor Ghaut road is undoubtedly a work of great importance, and it may be worthy of consideration whether a cheap bullock track, continued from the first zigzag of the Coonoor Ghaut up the valley for a few miles, in the direction of Kartery, would not facilitate the formation of a bazaar, where it is much needed, in the immediate neighbourhood of numerous coffee and Chinchona plantations. If so, the original cost of the line might be recovered in a short time by the levy of moderate tolls.

5. I notice, with pleasure, the skill and energy which have been displayed by Captain Law in conducting the works on the Coonoor Ghaut, and also the success he has met with in introducing a system of contracts by piece-work so generally.

6. The new roads which have been sanctioned by your Government from Ootacamund to Neddiwuttum, and thence through the Chinchona plantations to Goodaloor in Wynaad, also appear to be important, and to be lines which will give rise to a traffic fully justifying the original outlay.

7. I shall be glad to be placed in possession of your opinions on the suggestions thus thrown out, and to be kept informed respecting the progress of the new roads on the Neilgherry and Koondah hills.

I have, &c.
(signed) Cranborne.

— No. 90. —

From the Government of Madras to the Secretary of State for India.

Madras, 24 April 1866.

WE have the honour to forward, for your consideration and orders, the accompanying letter and its enclosure from Mr. C. R. Markham, recommending, for reasons therein stated, the grant of a pension of 500 rupees per annum to Mr. Spruce, the collector of the *C. succirubra*.

2. You will observe from Mr. McIvor's statement, forwarded with our despatch of this date, No. 16 (Miscellaneous), that the number of plants of *C. succirubra* at the Neilgherry plantation amounted on 31st March last to 301,067.

Enclosure No. 1, in No. 90.

From *C. R. Markham*, Esq., to the Secretary to Government, Revenue Department,
Fort Saint George.

Bellary, 24 February 1866.

1. BEFORE leaving India I cannot refrain from bringing to the notice of the Government of Madras the position of Mr. Spruce, the collector of the *succirubra*, or red bark species of chinchona trees, in the hope that they will take such action as the circumstances of the case may appear to them to call for.

2. The *C. succirubra* trees now cover the sides of the Neddivuttum Hills, and the benefit to India that will be derived from their cultivation is, I am sure, fully appreciated by his Excellency in Council. I therefore feel some confidence in bringing Mr. Spruce's case to their notice.

3. Mr. Spruce, after years of toil in the tropical forests of the Amazon, solely with a view to the advancement of science, and after ruining his health in the service of India, has returned to England completely disabled by sickness, and in extreme poverty, owing to the breaking of a commercial house at Guayaquil, where he had deposited all his savings, his losses even extended to the sum he had received from the India Office as remuneration for collecting the plants and seeds of *C. succirubra*, and for the admirable scientific reports which accompanied them. His losses were owing to no fault or even imprudence on his part.

4. The enclosed statement, to which I beg to call special attention, will give some idea of the great services to science and to India which have been performed, in the midst of no ordinary difficulties, by this distinguished traveller and botanist.

5. Mr. Spruce's position was brought to the notice of Lord Palmerston, in a memorial signed by all the presidents of the leading scientific societies of London, as well as by Sir William and Dr. Hooker, and Dr. Lindley. The memorial prayed for a pension of 100 £. a year, in consideration of Mr. Spruce's great services to science, and of his present circumstances. The late Prime Minister, in considering the case, said that Mr. Spruce's most valuable practical service had been done for India, and that, therefore, the English list should only bear half the cost of his pension. He accordingly granted him a pension of 50 £.

6. Under these circumstances, looking to Lord Palmerston's expressed opinion, and to the results that India will derive from Mr. Spruce's labours, I cannot but hope that the Government of India will make up the pension to 100 £, and thus enable one, of whom his countrymen may well be proud, to pass his few remaining years in some sort of comfort. When India is deriving great revenues and inestimable blessings from the red bark, it will not be pleasant to reflect that the eminent botanist to whom she owes these advantages was allowed to die without the means of furnishing himself with those few comforts which a sick man requires. One hundred pounds a year would enable him to exist in his present sad condition,—50 £. would not. The grant, therefore, of this trifling pension of 500 rupees a year for a few short years, will make all the difference between absolute want and comparative comfort.

7. Any recommendation from the Government of Madras, whose members know personally the results of Mr. Spruce's services, must have great weight. Trusting that this subject will receive favourable consideration from his Excellency in Council.

I have, &c.

Enclosure No. 2, in No. 90.

STATEMENT of the Results of Mr. *Richard Spruce's* Travels in the Valley of the Amazon, and in the Andes of Peru and Ecuador.

1. MR. SPRUCE left Liverpool on the 7th of June 1849, and reached Pará on the 12th of July. After spending three months in exploring the environs of that city, he ascended the Amazon to Santarem, at the mouth of the Tapajoz; and, in November of the same year, went 70 miles farther up, to Obydos, where the Amazon is at its narrowest and

1849.

deepest. Starting from Obydos, he explored the Trombetas and its tributary the Aripicurú, as far as the cataracts of the latter, in latitude $0^{\circ} 47' N.$, fixing five latitudes by astronomical observations, and making a map of those previously unknown rivers.

1850. 2. Returning to Santarem in January 1850, he remained there exploring the lower part of the Tapajoz and adjacent parts of the Amazon until October, when he started up the Amazon for the Barra do Rio Negro, where he arrived after a voyage of 63 days, 30 whereof were spent in the channels to the south of the great island of Tupinambárana.

1851. 3. The greater part of the year 1851 was occupied in studying and collecting the rich vegetation of the lower part of the Rio Negro, and of the Amazon, for a few days' journey up; and in November he started for the head-waters of the Rio Negro, in a boat of about nine tons burthen, which he had fitted up expressly with that object.

1852. 4. Early in January 1852, Mr. Spruce reached the village of Sao Gabriel, situated about midway of the cachœiras or cataracts of the Rio Negro, and after remaining there some seven months, he proceeded up the large River Naupes, which had been scarcely known to Europeans, even by name, until Mr. Wallace's adventurous exploration of it the preceding year. Mr. Spruce found the Naupes to possess a more novel and beautiful forest-vegetation than any other part of South America, and his collections include several undescribed genera, besides many species notable for their beauty and the value of their products.

1853. 5. Mr. Spruce remained on the Naupes until March 1853, when he sailed out of it into the Rio Negro, and up the latter river beyond the Brazilian frontier, to San Carlos del Rio Negro. This village was his head quarters during his stay in Venezuela, which extended to November 1854, or more than a year and a half. During that time he made two expeditions to the Orinoco, one by way of the Casiquiari, and the other by the portage of Pimichíú and the Atabapo. On the former of these, besides examining the Casiquiara, both ascending and descending, he explored its tributary, the Pacimoni, to its source, among the lofty and picturesque mountains called Imei and Tibiali; as also the River Cunucunúma, which bathes the western foot of the immense granite mass of Dinda, and enters the Orinoco a little below the bifurcation of the Casiquiari.

1854. 6. On his second visit to the Orinoco, he went as far down as the cataracts of Maypures, rendered famous by the narrative of Humboldt and Bonpland. There and elsewhere in the region of the Upper Orinoco and Rio Negro, he gathered many of the plants discovered by those illustrious travellers, and which had not been seen since by any botanist. He also constructed maps of the hitherto unsurveyed Rivers Cunucunúma and Pacimoni.

1855. 7. Leaving Venezuela, he descended the Rio Negro, and reached the Barra do Rio Negro about the end of 1854, after an absence of above three years. Having reposed there over two months, he took advantage of the steamers which had been lately established on the Amazon, to ascend that river beyond the Brazilian frontier, to Nanta, in Peru, near the mouth of the Ucayali, and from thence he went in canoes up the Maraúon and its tributary the Huallaga to Tarapoto, a large and thriving town in the ancient province of Maynas. In the lovely valley of Tarapoto, which, like many similar ones in the eastern roots of the Andes, will one day be the site of a magnificent city, when the immense resources of the Amazon valley and its unrivalled fluvial system shall have been fully developed; he remained nearly two years, and collected there, besides a vast variety of other plants, no fewer than 250 species of ferns, in an area of only 50 miles in diameter.

1856. 8. In March 1857, Mr. Spruce left Tarapoto for Ecuador, descending the Huallaga to its confluence with the Maraúon, then ascending the latter river and its affluents, the Pastasa and Bombonasa, to Canelos; finally through the forest of Canelos on foot to the village of Baños, at the foot of the volcano of Tunguragua. In this disastrous journey, which occupied a hundred days, he had to abandon all his goods in the forest, to escape perishing of hunger at the passage of swollen rivers.

9. Making Baños his head quarters, he devoted above six months to the exploration of the forests and paramos of its huge volcano, and of the upper part of the valley of the Pastasa.

1858. 10. In January 1858, he removed to Ambato, which for more than two years was his point of departure for excursions to Quito, Riobamba, &c., and to various points in the eastern and western Cordilleras of the Quitenien Andes, although his movements were much harassed and restricted by the revolutionary state of the country during nearly the whole of that period.

1859. 11. In 1860, Mr. Spruce communicated a valuable paper to the Royal Geographical Society, on the mountains of Llanganati, in the eastern Cordillera of the Quitenian Andes. (Journal for 1861, pages 163-184.) He has also communicated numerous important papers to the Linnæan Society.

1860. 12. In 1860 he was occupied for some months in procuring seeds and plants of the *Chinchona succirubra* or red bark plant, for cultivation in India, a task which was confided to him by Mr. Clements R. Markham, on behalf of Her Majesty's Government. Mr. Spruce displayed great zeal and resolution in performing this arduous service, while suffering from the effects of a rheumatic fever, and his labours received the unqualified approbation of the Secretary of State for India.

13. His elaborate report on the expedition conducted by him to procure these seeds and plants (accompanied by a meteorological journal, and a complete sketch of the vegetation of Chinchona forests), is by far the best that has appeared on this subject in any language; and has been invaluable as a guide to the cultivation of these precious plants in India. It covers 112 printed pages.

14. Afterwards, his broken health seeming to require a return to a warm climate, he removed to the plain of Guayaquil, and his active labours as a botanist, may be said to have closed with the picking up of a few plants in that neighbourhood during the year 1861, and during 1862 at Chanduy, on the coast, near Punta Santa Elena, where an exceptional rainy season, coming after an interval of 15 rainless years, enabled him to make a small but interesting collection of the ephemeral plants which under the influence of the rains sprang up on the desert, and also of several curious trees and shrubs whose blackened stems had not for some years past put forth even a leaf.

1861.

1862.

15. The results of this long course of travel (whose objects were at first purely botanical) comprise from 6,000 to 7,000 species of flowering plants and ferns, whereof a very large proportion were entirely new to science, especially among the trees, whose timber and other products were also ascertained to be in many cases of great value. Several new species may be instanced, and one entirely new genus, of trees producing the best kind of caoutchouc, which is now extracted from them in large quantities by the Brazilians, but was not before until Mr. Spruce pointed the trees out on the Rio Negro and elsewhere. His specimens of all these plants are preserved in the principal public and private collections in the world, and are, therefore, perfectly accessible for the purposes of science. A very large collection of cryptogamic plants, perhaps the largest ever made by any single collector, still remains to be worked up.

16. Mr. Spruce's MSS. contain, besides notes on all the plants collected, vocabularies of 21 native languages of the Amazon valley, meteorological observations, barometric levellings, &c., throughout the regions visited, maps of three rivers which had not previously been surveyed, notes of travel, of the aspects and capabilities of the various countries, of the customs, food, trade, and agriculture of their inhabitants.

Note by Mr. *Bentham*, President of the Linnæan Society, on Mr. *Spruce's* services to Botany.

1. MR. SPRUCE, before his expedition to South America, was well known for the zeal and assiduity with which he collected, and investigated, in various branches of botany, especially in the muscology of Yorkshire and the Pyrenees.

2. His researches into the vegetation of the interior of South America have been the most important that we have had since the days of Humboldt; not merely for the number of species he has collected, amounting to upwards of 7,000, but for the number of new generic forms with which he has enriched science; for his investigations into the economic uses of the plants of the countries he visited, for several doubtful questions of origin as to interesting genera and species which his discoveries have cleared up; and for the number and scientific value of his observations, made on the spot, and attached to the specimens preserved; all which specimens have been transmitted to this country, and complete sets deposited in the National Herbarium at Kew.

— No. 91. —

From the Secretary of State for India to the Government of Madras.

India Office, 1 August 1866.

I HAVE considered, in Council, your letter in the Revenue Department, dated the 24th of April 1866, forwarding a letter from Mr. Clements Markham, recommending, for reasons therein stated, the grant of a pension of 500 rupees per annum to Mr. Spruce, the collector of the *Chinchona succirubra*, of which a very large number of plants has been successfully planted out in the Neilgherry plantations.

2. There are not, in my opinion, sufficient grounds for the unusual course of granting a pension to Mr. Spruce, on account of the introduction of the *Chinchona succirubra*; but in recognition of the advantages derived by India from the services of that individual, I have granted to him a further donation of 200 l.

— No. 92. —

From Mr. *Bourdillon* (Secretary in the Public Department, India Office)
to Mr. *Richard Spruce*.

Sir,

India Office, 27 July 1866.

I AM directed by the Secretary of State for India to acquaint you, that your services, in connection with the introduction of the *Chinchona succirubra* into India having been again brought under his consideration by Mr. Markham, his Lordship has been pleased to grant you a further donation of 200 l., in recognition of the advantages derived by India from your labours.

— No. 93. —

MEMORANDUM by Mr. *Markham* on Mr. *Spruce's* Claim.

26 July 1866.

THE Secretary of State has granted Mr. Spruce a sum of 200 *l.* He was granted 200 *l.* in 1863, and 360 *l.*, being payment for his work in the Chinchona forests, at the rate of 30 *l.* a month, from January to December 1860, in 1861.

The agreement was, that he should have his expenses paid while engaged in the service of the Secretary of State for India, and receive a salary at the rate of 30 *l.* a month.

From 15th July 1859 to 18th October 1859, he was engaged in exploring the forests, to ascertain the best localities for collecting plants and seeds of *Chinchona succirubra*. This was clearly a part of the actual service he was employed upon. He performed it at his own expense, and it entailed upon him a severe attack of fever. His expenses were at the rate of 30 *l.* a month, and his salary 90 *l.* for three months; total, 180 *l.*

From January to December 1860 he was actively engaged in the forests, collecting plants and seeds, and his expenses and salary of 360 *l.* for this period have been paid to him.

During January and February 1861, Mr. Spruce was occupied in getting together his horses and goods in the forest, where he had been established for a year, but he was unable to recover all his horses. Two of his mules were seized by a band of rebels. He was also engaged, during this time, in arranging and labelling the plants he collected in the Chinchona forests. He is entitled to his salary for these two months, amounting to 60 *l.*; and also to a small sum for expenses connected with the recovery of his horses, the loss of his mules, and for having used his own horses; being items he refrained from charging in his account; at least another 20 *l.*; total 80 *l.*

After leaving the forests he was attacked by fever, with threatenings of paralysis during March and April 1861; illness incurred in the service of the Secretary of State, which prevented him from commencing his Report, or from occupying himself in the employments by which he usually made his living. During this period he was entitled to his salary, 60 *l.*

He was employed in preparing his Report during the whole of May 1861, and in arranging his meteorological and other observations, and his botanical specimens. He was entitled to his salary during this period, 30 *l.*

Mr. Spruce's Report has proved of the greatest value to the cultivators of Chinchona plants in India and Ceylon. It is a careful and accurate treatise on the climate, soil, and flora of the "Red Bark" forests, and supplies information which could not have been obtained elsewhere. No work on that particular subject, which has appeared in Europe within the century, can be compared with it, in the amount of practical information which will be useful to cultivators. He is justly entitled to some remuneration for this most valuable Report, which he was directed to draw up, in addition to mere payment for his time. For his Report on the cotton of Peru, he received 20 *l.* (80 pages, or 5 *s.* a page). The Chinchona Report contains 110 pages, but they consist of very much more valuable matter, including a full scientific description of *C. succirubra*, and an elaborate meteorological journal. However, at the same rate as was paid for his Cotton Report, the just remuneration due to Mr. Spruce for his Chinchona Report is 27 *l.*

Before he had quite completed his Report, the illness contracted in the forests, in the service of the Secretary of State of India, came on again, and he has never been well since, nor able to resume any of the occupations by which he formerly obtained a living. He, however, managed to make out a copy of his rough notes by little and little; only able to write for a few minutes at a time with great pain and difficulty, and in a sitting posture, in a hammock. Under these circumstances, he was at last able to complete and send off his Report, in the end of September 1861. For the whole of this time, from June to September, he was thus employed in work connected with the Chinchona undertaking, during the intervals that severe illness contracted in the service permitted it; and he is clearly entitled to his salary for this period of four months, 120 *l.*

The

The account between Mr. Spruce and the Secretary of State for India, therefore stands as follows:—

Due to Mr. Spruce.		Paid to Mr. Spruce.	
	£. s. d.		£. s. d.
Salary for three months (15 July to 18 October 1859) in the Chinchona forests.	90 - -	Salary for 12 months (January to December 1860).	360 - -
Expenses for same period - -	90 - -	Further sum granted in April 1863	200 - -
Salary for 12 months (January to December 1860) in the Chinchona forests.	360 - -	Further sum granted in July 1866	200 - -
Salary for two months (January and February 1861) in the Chinchona forests.	60 - -		
Loss of mules and expenses connected with recovering his horses.	20 - -		
Salary for two months (March and April 1861) while suffering from fever contracted in the service.	60 - -		
Salary for one month (May 1861) while preparing his report.	30 - -		
Remuneration for Chinchona Report	27 - -		
Salary for four months (June to September 1861) while completing his report in the intervals of severe illness contracted in the service.	120 - -		
TOTAL sum due to Mr. Spruce } - - £.	857 - -	TOTAL sum paid to Mr. Spruce } - - £.	760 - -
Sum due - - - - -	£. 857 - -		
Sum paid - - - - -	- 760 - -		
Portion of salary and expenses still due to Mr. Spruce - -		£. 97 - -	

I am anxious that it should be clearly understood that Mr. Spruce's modest opinion of his own deserts, and his high sense of honour, have prevented him from making any representation himself on this subject, either directly or indirectly, since he sent in his original account of expenses and claim for salary for 12 months' work. But the fact that he has not represented his own case is, I respectfully submit, a reason why it should be most carefully considered by the Secretary of State. Not only has he received no special recognition of the great and valuable service he has rendered to India, but the sums rightfully due to him for actual salary and expenses have not been paid, even on the scale on which the amount of that salary was modestly fixed by himself. I must further represent that the salary thus fixed, is out of all proportion small when the high qualifications of the very eminent botanist who was employed, and the difficult and perilous nature of the service to be performed, are considered.

The value of Mr. Spruce's services may be calculated from the actual present value of the plantations of *C. succirubra* on the Neilgherries, in Ceylon, at Darjeeling, and in the Kangra valley. Twenty thousand pounds have already been offered for those at Neddiwuttum alone, and in three or four years they will realize double that amount. But the money value of the plantations does not represent the incalculable benefit which the collection of this species of Chinchona has conferred on the millions of people who suffer from fever in India. The high qualifications of Mr. Spruce, and the difficulties and dangers of the service he performed, must also be taken into consideration.

As my earnest appeal, through the Madras Government, for a small pension to this distinguished botanist, has been unsuccessful; and as he is to receive no special recognition of the great service he has performed for India, I respectfully submit that he should be at least paid the full amount which is due to him as salary and expenses. He was my most efficient, and my only educated and scientific assistant in South America, and I therefore feel it to be my duty to see, at least, that his case is clearly and distinctly stated.

Note.—The Secretary of State in Council sanctioned the further payment of 97 *l.* to Mr. Spruce, on August 16th, 1866.

— No. 94. —

CHINCHONA PLANTS ON THE NEILGHERRY HILLS, 1861, 1862, 1863, 1864, 1865, to April 1866.

D A T E.	C. succubra.					Chinchona yielding Grey Bark.				C. Officialis.				C. lancifolia.	C. Pahundiana.	Total Number of Plants.	Total Number Planted out.	Number of Plants Distributed to Private Persons.
	Number.	Average Monthly Growth.	Height of Tallest Plant.	Girth of Stem of Largest Plant.	Yield of Febrifuge Alkaloids.	C. Calisaya.	C. micrantha.	C. nitida.	C. Peruviana.	C. Species without Name.	Variety Condallinea.	Variety Bonplandiana.	Variety crispata.	Average Monthly Growth.				
1861:		Inches.	Feet. ins.	Inches.	Per cent.									Inches.				
June -	967	1½	2 6	-	-	6	511	430	28	172	-	-	-	-	-	2,114	-	-
July -	1,204	1½	2 10	-	-	6	802	714	36	211	-	-	-	-	-	2,973	-	-
August -	1,817	3	3 2	-	-	6	896	804	42	271	-	-	-	-	-	3,536	-	-
September -	2,361	2½	3 6	-	-	6	905	840	42	298	-	-	-	-	-	4,452	-	-
October -	3,137	2½	3 9	-	-	6	905	854	58	314	-	-	-	-	-	5,315	-	-
November -	3,477	2½	3 9	-	-	6	963	917	58	314	-	-	-	-	-	5,847	-	-
December -	4,762	-	-	-	-	6	1,223	917	64	314	-	-	-	-	-	7,466	-	-
1862:																		
January -	5,200	-	4 0	3½	-	59	1,497	1,050	64	314	-	-	-	-	4	425	-	-
March -	6,580	-	4 6	-	-	67	1,713	1,000	60	308	-	138	-	-	4	425	-	-
August -	30,150	-	-	-	-	1,050	7,400	8,500	2,295	2,440	41	20,030	236	-	1	425	-	-
November -	36,217	6½	-	-	-	1,286	8,110	8,542	2,477	2,514	820	27,957	287	-	1	425	-	-
December -	42,184	-	6 9	5½	-	1,372	8,148	8,565	2,574	2,542	850	37,781	464	-	1	425	35,000	-
1863:																		
January -	45,352	4	-	-	-	1,448	8,304	8,591	2,729	2,569	872	46,761	664	-	1	425	35,000	-
February -	45,507	3½	-	-	-	1,424	8,247	8,296	2,772	2,579	891	54,790	739	-	1	425	35,000	-
March -	48,989	3½	7 2	5½	-	1,480	8,326	8,312	2,847	2,595	927	61,012	825	-	1	425	35,000	-
April -	51,643	4½	-	-	-	1,540	8,424	8,326	2,937	2,623	969	68,757	903	-	1	425	35,000	-
May -	53,854	5½	7 6	6½	-	1,587	8,517	8,345	2,961	2,638	1,051	77,322	1,003	-	1	425	35,750	1,619
June -	56,385	5½	-	-	-	1,607	8,584	8,358	2,939	2,654	1,103	84,050	1,056	-	1	425	41,397	-
July -	60,365	6½	-	-	-	1,571	8,734	8,380	3,038	2,681	1,197	104,871	1,085	-	4	425	48,028	-
August -	65,216	4½	-	-	43	1,627	8,956	8,385	3,062	2,706	1,269	119,616	1,126	-	4	425	58,401	-
September -	70,105	5	9 2	-	-	1,672	9,322	8,388	3,071	2,724	1,345	126,863	1,192	-	4	425	64,783	-
October -	76,599	1½	9 6	9½	6	1,725	9,473	8,394	3,097	2,734	2,880	126,863	1,280	-	6	425	65,955	-
November -	80,550	3½	-	-	-	1,735	9,719	8,399	3,132	2,736	4,733	135,358	1,373	-	6	425	66,622	-
December -	82,558	3½	-	-	-	1,735	9,719	8,399	3,132	2,736	4,733	135,358	1,373	-	6	425	66,622	4,480

— II. —

COLLECTION OF SEEDS OF CHINCHONA DE PITAYO IN
SOUTH AMERICA.

— No. 1. —

MEMORANDUM by Mr. C. R. Markham, on Mr. Cross's Employment to Procure Seeds of *Chinchona de Pitayo*.

IN order to complete the introduction of all the valuable kinds of *Chinchona* into India, I have always considered it to be very important that seeds of the species which grow at and near Pitayo, in New Granada, should be obtained. This species is very hardy, it yields a large per-centage of quinine, and it is likely to thrive in the Himalayas, as well as on the Neilgherries.

Accordingly, I obtained the sanction of the Secretary of State for India to make arrangements for the collection of seeds of the Pitayo *Chinchona*, and employed Mr. Cross on this service, who had served under Mr. Spruce in the collection of plants and seeds of the *Chinchona succirubra*, and had afterwards himself made a collection of the seeds of the *Chinchona officinalis* in the Loxa forests.

Mr. Cross set out on this difficult and important mission in the beginning of May 1863, from the table-land on the western slopes of the Chimborazo mountains, where he was then residing. The present report gives an account of his journey, and of his proceedings connected with the collection of *Chinchona* seeds at Pitayo. It is exceedingly interesting, because very few really observant travellers have ever gone over the same ground; and even Humboldt, who visited Popayan, never penetrated into the forests which were carefully examined by Mr. Cross. It also contains valuable information respecting the climate of the Pitayo region, which will be very serviceable to cultivators in India. Mr. Cross deserves great credit for the skilful and energetic way in which he performed a difficult service, and for his courage and perseverance in facing dangers and hardships of no ordinary nature.

Unfortunately he deviated from my instructions in not sending the seeds direct to England from Bogota, through the English Minister. He went back with them by way of Quito to Guayaquil, and the delay caused by this return journey, the terrible nature of which Mr. Cross has so graphically described, was fatal to the seeds. Not one of them has germinated.

I have obtained permission to employ Mr. Cross to make a second collection of the seeds of the Pitayo *Chinchona*, and there is every prospect that his labours will on this occasion be rewarded with more successful results. It is certainly most important that this species should be introduced into India.

The accompanying map is based on those of Restrepo and Humboldt, which, though very incomplete, are the best we have of the little known part of South America between Pasto and Bogota. Some additional names of places have been added from Mr. Cross's report, but the complaints of the want of good maps of this region, which were made by Caldas 50 years ago, as truly describe the state of things now.*

The first writer who described the country round Popayan and Pitayo was the Spanish *Conquistador*, Cieza de Leon. He accompanied the invading discoverers who, starting from Darien in 1536, ascended the valley of the Cauca, and reached Popayan. I translated and edited his charming "Cronica" last year, and it has been printed by the Hakluyt Society. The next author who treated of this region was the humane and generous, but unfortunate, Adelantado Andagoya, who was at Popayan in 1544. His narrative, which I have also translated and

edited,

* "Semanario de la Nueva Granada, p. 9."

edited, will be found amongst the collections of Navarrete. Ulloa, in his travels, gives a brief general account of the Popayan province. The only modern writers who have preceded Cross are Humboldt, Caldas, Karsten, and Vigne. Humboldt crossed the *paramo* of Quindiu, ascended the valley of the Cauca to Popayan in 1801, and went hence to Pasto and Quito. During his stay at Popayan he made an excursion to the village of Puracé. The learned Caldas was a native of Popayan. He was a good botanist and an excellent observer, and he knew the country well. Most of his writings are unfortunately still in manuscript, but some of them have been printed in the "Semanario de la Nueva Granada," amongst which there is a very valuable geographical memoir written in 1807. Dr. Karsten was for some years in this part of South America, investigating the botany of the Andes. I caused his notes on the medicinal Chinchona barks of New Granada to be translated in 1861, and copies were sent to India in the form of a pamphlet. Finally, Mr. Vigne travelled for his amusement from Quito to Bogota, going over exactly the same route as Cross, and his travels were published in 1863. Among these writers, Caldas and Vigne are the only ones who have gone over the same ground as Cross, and no one had given any account of the actual Pitayo forest previous to Cross's visit.

I have added a few explanatory foot-notes with the initials C. R. M.

India Office, March 1865.

Clements R. Markham.

— No. 2. —

From Mr. *Mocatta*, Acting Consul General in Ecuador, to the Secretary of State for India.

Sir,

Guayaquil, 14 February 1864.

I HAVE the honour to report, for the information of your Department, that I transmit to you by this mail, a tin case containing about one and a half million of seeds and specimens of the bark of the *Chinchona lancefolia* variety of Pitayo, collected by Mr. Robert Cross, in the Province of Pitayo, in the Republic of New Granada.

From information furnished by Mr. Cross, I am able to state that he started on the expedition in the beginning of May 1863, proceeding by way of Quito to Popayan, and thence to Pitayo, arriving there in the month of June. He finished the drying of the seeds in August, and after passing the *paramo* of Huanacas, proceeded down the great valley of the Magdalena to Tocayma, and thence diverging eastward, ascended the plains on which the city of Bogotá stands, arriving about the 16th September.

Not having received any instructions regarding the collection, but more particularly on account of the in-communication between Bogotá and Carthagena, he returned by way of Quito, with the collection to Guayaquil. He states that the road from Popayan to Quito was one continued mass of mud, and that the difficulties he encountered were very great. On passing the *paramo* of Huanacas, his muleteer and mules nearly perished from the cold. In passing through the valley of the Magdalena, he was forced to cross 15 rivers; of these seven were forded by means of canoes. All these difficulties were increased on account of the state of the country, caused by the war between Ecuador and New Granada.

On receiving at Quito a communication from Mr. Markham, he proceeded immediately to Guayaquil, notwithstanding the rainy season, and the very bad condition of the roads, and delivered the collection into my hands for transmission.

Mr. Cross describes the temperature of the climate in which this species of the Chinchona grows, as ranging from 30° to 60° Fahrenheit, and is decidedly of opinion that any plantation which may be formed for its cultivation, should be southward of the village of Ootacamund.

Mr. Cross also recommends that these seeds be sent to the Neilgherry Hills of India, as he believes that to be the locality best suited for this species of Chinchona. Mr. Cross also states his intention of furnishing a report of his journey,

with description of climate, soil, and general habit of the Chinchona of Pitayo, together with the mode of barking the trees.

I have, &c.

(signed) *Francis Mocatta*,

Her British Majesty's Acting Consul General.

Her Majesty's Secretary of State for India,
India Office, London.

— No. 3. —

From Mr. *Mocatta* to Mr. *C. R. Markham*.

Dear Sir,

Guayaquil, 14 May 1864.

I HAVE received your note of the 16th March last, and informed Mr. Cross that he is at liberty to draw on me for the sum of 150 *l.*, according to your instructions, as compensation for the collection of Chinchona seeds dispatched from this office on the 14th February last.

In his last letter to me, Mr. Cross states that ill-health has prevented him from furnishing the report on the culture, climate, and *habitat* of the Chinchona plant, as he had promised.

I remain, &c.

(signed) *Francis Mocatta*.

— No. 4. —

From Mr. *Cross* to the Under Secretary of State for India.

Sir,

N. Slopes of Chimborazo, 10 December 1864.

ON the 17th of April 1863, I received a communication from Mr. Clements R. Markham, respecting the collecting of seeds of the *Pitayo Chinchona* in New Granada, and I was instructed by him to proceed to the region of Pitayo, and examine the country around Purace, Hambalo, and Totoro, whence the finest bark (now comparatively scarce as an article of commerce) has yet been obtained. At the time I received these instructions I was residing near the "Red-bark" forests, on a high table-land on the western slopes of Chimborazo, at an elevation of 10,000 feet above the level of the sea.

The interior of New Granada was at this time in an unsettled state, and had been so for about two years previously. The roads, which in time of peace were scarcely passable, had during the revolutionary period been entirely neglected, and the contending parties, in order to arrest the progress of each other, broke down bridges, destroyed plantations of sugar-cane and bananas, and, in the lofty upland districts, where there existed wheat and other grains, the crops were burned, together with the farm-houses or other establishments. In this way the necessities of life became so scarce, especially in the valleys of Patia and Popayan, that a single green plantain, about the size of those ripened in hot-houses in England, cost 3 *d.*; an ounce of wheaten bread, so bitter and full of earthy particles that it could scarcely be eaten, was procured with difficulty for 6 *d.*, and a pound of salt was sold in the village of Patia for 6 *l.* sterling.*

A glance at the map does not convey an idea of the extent of country traversed; besides which, many of the difficulties encountered were of a perilous nature, frequently endangering the loss of life. The whole journey was in fact a kind of martyrdom, during which excessive cold or heat, thirst, and hunger, were frequent companions; and the life of the wildest travelling savage was princely compared with mine, during the greater part of the way. The encampment for the night was often made away from other dwellings, sometimes on hot sand-covered plains beneath low spreading légumes, where formidable species of ants abounded in unlimited numbers; or in the bottom of deep ravines, where a rank vegetation

mostly

* Calculated according to the exchange of British currency at Guayaquil.

4

B. Magdalena

B. de

R. Nariño

3

P. Coco

° Micay

P. Reyes

R. Iscuande

R. Guapi

° Guapi

° Iscuande

2

R. Pasto

R. Tirophi

Barbacoas

R. Mugui

° Guayquer

° Muillama

Matigayo

Men

Pasto

Yumbato

R. Mira

R. Juncal



mostly prevailed; or among black volcanic rocks on wild stormy *paramos*.* Nevertheless, the grandly picturesque scenery of the country through which the way led compensated in some measure for the hardships endured.

Shortly before setting out, I purposed making a collection of plants by the way, which would have been interesting, as they would have conveyed an idea of the different tracts of country travelled over, but I was compelled to relinquish this object, owing to the great distance which had to be traversed in a given space of time. I found, too, in order to do full justice towards the Chinchona, that I must concentrate all my time and energy on that point, for no dependence is to be placed on the statements of the natives concerning anything, without a personal examination. Moreover, I wished to conceal as far as possible the actual object of my journey, lest the natives should, if aware, make an attempt to hinder or completely prevent the accomplishment of the object in view. I purchased mules for the journey, for, although they are to be obtained for hire in some places, yet it is not so everywhere, and besides, at every station where they are to be had, there is always a delay of several days, for time is of no importance to the Spanish American. With my own mules I was able to march as circumstances permitted, either by day or night, and make more rapid journeys than I could have done with hired animals.

On the 6th of May I commenced the ascent of the northern shoulder of Chimborazo, and about mid-day reached the highest part of the pass, which has an elevation of nearly 15,000 feet. On commencing the ascent, the way led over irregular rising ground, part of which bore crops of barley, wheat, and potatoes. Higher up, near the upper limit of forest, are extensive *paramos*, where only little patches of barley, and an edible species of *Oxalis* can be cultivated. Above this limit immense tracts are covered by a species of *Stipa*, which, with *Gentians*, *Chuquiragua insignis*, and other plants of the order *Asteracæ*, ran up to the very verge of perpetual snow. There can be no doubt that *Chuquiragua insignis* occupies one of the highest elevations of any shrub on the Andes.

On reaching the summit of the pass, a large plain called the "Arenal Grande" has to be crossed before descending the eastern slope. This plain consists of a yellow coloured *débris*, intermixed with fragments of burnt clay and lava. At some former period it seems to have been covered by a deposit of soil about three feet in depth, portions of which still remain; but, in consequence of the fierce tempests of rain and hail to which this lofty platform has been subjected, the greater part has been washed away. Two streams of considerable size, which rise from the base of wild, dark cliffs near the snow limit, and bear the names Rio Colorado and Rio Blanco (red and white rivers), flow westward through the "arenal," and ultimately find their way to the Pacific Ocean. On crossing the "Arenal Grande" the way led down steep grassy slopes on which grazed herds of sheep and llamas; and I soon found myself in a more genial temperature than that experienced on the summit of the pass.

There are two roads by which Chimborazo may be crossed: one passes over the southern shoulder of the snow-covered mountain, which is the principal route for travellers and commerce; and the other leads over the northern shoulder, and is the one mostly used by the Indians. The latter is rather higher than the southern pass, and leads for a considerable distance near the line of perpetual snow; but I was compelled to take this way, from the circumstance of being located beside it. At about 5 p.m. I reached a small farm on the edge of the *pajonales*, where I remained for the night. On the morning of the 7th the descent was resumed; when, after crossing a number of deep, dry ravines, I entered the town of Hambato about midday. Hambato is built on sloping ground, which is covered by a deep deposit of sand, on the southern bank of the river Hambato, which is merely a considerable stream of water, and takes its origin from the melting snows of Carguirazo and Chimboraza. In the surrounding districts, maize and European grains are raised on the sand-covered slopes by artificial irrigation; and there are also plantations of peaches, cherries, apples, and pears. All the fruits are inferior in size and flavour to those seen in the

English

* The word *paramo* is applied, in Ecuador and New Granada, to all those mountainous regions which are elevated from 10,000 to 15,000 feet above the sea, and in which a cold, rough, and misty climate prevails. The same tracts are called *punas* in Peru.—C. R.M.

English markets, owing to the poor varieties of trees which the inhabitants possess, and to their entire ignorance of the principles of cultivation.

I remained at Hambato until the 25th of May, for the road to the eastward of Tacunga had been rendered impassable by a great flood of water, which was said to come from a late eruption of Cotopaxi.

On the 25th the march was resumed, the way leading north-east over an irregular sand-covered plain, which here occupies the place of the Central Cordillera. The road on each side was well hedged in by monstrous specimens of *Agave Americana*, which flourishes in a temperature similar to that of an English summer.

Late in the afternoon I halted about a league to the eastward of Tacunga, immediately in front of the snow-covered cone of the volcano Cotopaxi. During the night a continual rumbling noise was heard from the volcano like loud thunder; and a red flame of fire and sparks rose to a height of not less than 1,000 feet above the summit of the crater.

On the 26th I proceeded across an extensive plain that lies along the base of Cotopaxi, which appears to have been formed entirely of matter thrown from the volcano. The vegetation here was exceedingly scanty, consisting of several cactæ, a gynerium, and a few composites. On leaving this plain, the way led over a lofty ridge, which separates the desert land that lies around the base of Cotopaxi from the green plains of Quito. About 4 p.m. I reached the village of Machache, where I remained for the night.

May 27th, I travelled over undulating plains of rich pasturage, and entered the city of Quito about four in the afternoon. At Quito I met with Dr. Jameson, Professor of Botany in the University, and director of the mint, to whose labours in the cause of botany scientific men are chiefly indebted for the knowledge possessed of many rare plants that are only found at very high elevations on the Quitenian Andes. This, without an exception, was the best and most honest gentleman I have yet met anywhere during my travels, and I have been often assisted by him in various ways.

Quito is situated in an extensive plain, on each side of which run ridges of lofty mountains, the higher summits of which are covered by perpetual snow. The streets of the city are in general irregularly formed, badly paved, filthy, and the drainage is insufficient. The houses are mostly built of mud bricks, and covered with tiles. The population presents a mixed appearance of effeminate refinement and degradation or barbarism; the wealthier classes of Spanish Americans walk about the streets attired in the newest fashions of Paris, while side by side, with merely a piece of dirty coarse cloth wrapped round their waists, and with loads of mud bricks on their backs, run the ever dutiful children of the Incas. The city is chiefly remarkable for its churches, convents, and monasteries, employing it is said, one way and another, nearly 1,000 priests; which, judging from the hosts that are continually flapping along the streets in various coloured vestments, I can well believe. No branch of commerce or manufacture is carried on to any extent; the people seem daily engaged in devotional exercises at the churches, where a kind of chanting is always to be heard, and ringing of bells perpetually.

On the 3rd of June I left Quito, accompanied by a muleteer, and pursuing a northerly course for two hours came to the ravine of Guallabamba, which had to be crossed, and which was one of the steepest descents I have yet seen. The descent, which occupied two hours, brought us from a cold table-land, fit only for grain and potatoes, to a hot climate where bananas and other fruits grew and ripened in abundance. I stayed for the night beside a little hut near the bottom of the ravine, where food was procurable for the mules.

On the 4th, about 2 a.m., the mules were saddled, and I proceeded by moonlight over an arid tract of country, and, as day broke, began the ascent of a high table-land which lies to the northward of the snow-clad mountain Cayambe. The march was continued over this lofty plain until dusk, when I halted at the ruins of a farm-house that had once pertained to the Jesuits of Quito. During the night I was perfectly famished with cold, for the only shelter I had was a little hut which had no walls, and the wind, coming down from the snowy slopes of Cayambe, swept violently through it and rendered it most uncomfortable.

At daylight on the 5th the mules were caught with great difficulty on account of the cold, and I proceeded over an irregular tract of country until mid-day, when

when the way descended to a flat green plain, which had in its centre a small lake (Laguna de San Pablo), on the eastern side of which is the village of San Pablo, and on the western the ancient town of Otovalo. The scenery of this locality is very beautiful. On the eastern border of the lake is seen the snow-capped mountain of Imbabura, which presents more regular and symmetrical slopes than any other mountain I have seen in South America. At the base of this extensive mountain, in a little green plain which slopes down to the edge of the lake, are a number of green hillocks or tumuli, which mark the resting places of the ancient caciques of the Incas. The low-lying land which surrounds the lake is, in fact, full of tumuli, and so is the adjoining valley of Cotacache; but some of those near the latter place are 400 feet high, and, as the soil was all carried thither by Indians, must have cost a great amount of labour.

After passing along the eastern border of the lake, the way led down a steep descent to a tropical valley, in which stands the city of Ibarra, which I reached about dusk. Ibarra is a city of considerable extent, and has a cathedral and some large churches, but it presents no commercial feature. Sugar cane, bananas, and chirimoyas grow everywhere around, and the land is evidently of a very fertile character.

On the 8th I left Ibarra, and ascended a lofty sand-covered ridge, and then descended to the river and valley of Chota, whence a zigzag ascent led up to the paramo of Yascon, which is about two miles to the southward of the Indian village of Mira. A halt was made for the night on a flat plain above Yascon, the mules being fastened with ropes to feed near the encampment, and removed every two hours, and this plan enabled me to march early without time being lost in catching them.

On the 9th I went on to a village called Tusa, over very lofty cold plains, mostly barren; the deposit appearing to consist of volcanic sand and mud, but bound so together that nothing except a few half-starved *Gyneriums* exist in holes or gullies, which retain the rain water until it evaporates.

June 10th, I left Tusa, and, after passing over a series of cold table-lands, entered a forest about mid-day, which continued all the way to Guaca, where I arrived about dusk. Guaca is a small village in the heart of the forest, subjected to torrents of rain and mist all the year round. About three miles to the eastward there runs a lofty ridge of forest-covered mountains, which is the Cordillera Orientale, whence Chinchona bark is sometimes taken out, but it is of inferior quality.

On the 11th I proceeded northward, and after four hours' journey through the forest, ascended the lofty paramo of Bolichi, which is clothed with *Melastomacæ*, brambles, and a species of *Stipa*; and thence descended to an undulating plain, enjoying a mild temperature, in which stands the town of Tulcan,* where I halted for a short time, and then pushed forward to the village of Carlosamos, that lies to the northward of the River Carchi, which is the dividing line between the republics of Ecuador and New Granada. At this place I was examined by the New Granada officials, to see whether I was not carrying contraband goods across the frontier. After some delay, I left for the village of Pastasa.

On the morning of the 12th I left Pastasa, and, after crossing a low, forest-covered eminence, came out on the cold plain of Tuquerres, which has a general elevation of 10,500 feet. This plain is of great extent, and has large tracts of marshy land, especially along the base of the mountains of Cumbal and Chiles. I saw here a *Barnadesia* with white flowers; and on the drier slopes a dwarf species of gentian, in full bloom, covered the ground as thickly as daisies do any pasture field in England. On several of the mountain slopes which surround this plain, grows abundantly the *Chinchona lancifolia*, var. *corymbosa* of Karsten, but it is not now collected.

Towards the close of the day I passed through the village of Tuquerres, which is an exceedingly cold, miserable-looking place, and the streets are knee-deep with mud. Beyond Tuquerres, the way led down a deep descent to the bottom of a tropical ravine called the Huaytara; but I remained for the night above the tropical limit, in consequence of the great number of bats which exist near the bottom of the ravine.

On the morning of the 13th the march was continued, and the whole day was spent

* See Vigne's Travels, ii. p. 227.—C. R. M.

spent in crossing the ravine and getting out of the reach of the bats on the eastern bank.

June 14th, I left the Huaytara and ascended a high, forest-covered ridge, and, after crossing the summit, descended to a green valley of no great extent, in which is situated the city of Pasto. The valley enjoys a mild temperature, and is surrounded by forest-covered mountains, from whence is obtained a species of Chinchona, which is exported mostly to the United States. Around the town, and along the base of the mountains, are fine fields of pasture; but at the time of my visit they were completely eaten up by the swarms of cattle belonging to the New Granada Government. Pasto is famous for its vegetable dyes, but they are all brought by the Indians from the banks of the Caqueta and Aguarico. I remained at Pasto until the 25th, because I thought it my duty to examine the adjoining forests, in order to see what kind of bark was there collected. None is now collected on the volcano of Pasto, which is only a short distance to the westward of the city; but considerable quantities, at the time of my visit, were collected on the mountains which bound Pasto to the south-east, near to the Lagoons, where the Incas formed their most northern colony before the Spanish conquest, and where the Quichua language is still spoken.

There was much bark at this time in Pasto, and also in sheds in the forests, but no one cared much about buying it, as the yield of quinine is often too small to leave any profit. This bark has a yellow or orange colour, and the fracture is very coarse and fibrous. The tree is evidently the *Chinchona lancifolia* of Karsten and others. It grows to a great size, has large lanceolate, coriaceous leaves, and the bark, which is covered with a silvery epidermis, presents vertical cracks, or gashes, on the surface. I did not make any effort to collect seeds here, as I had received undoubted intelligence that the best bark was found near the city of Popayan.

On the 26th June I left Pasto, and travelled over a mountainous ridge for four hours, when the way led down a precipitous slope to a little hamlet called Ortega.

Early on the morning of the 27th I departed from Ortega, and after traversing several grassy slopes, I descended by a series of stony *travesias* to the bottom of a deep ravine, through which rushed a large body of red-coloured water over a precipitous descent of rocks and large stones, that kept it in perpetual foam, and its noise was distinctly heard at the distance of a mile. This is the ravine of Guanhambu.* On reaching the bottom of the ravine, the way led to the edge of a profoundly deep precipice, below which raged the river in all its fury, and from this point travellers are conveyed to a rock on the other side by a basket, or other contrivance, which is suspended from several cords, that are stretched from one side of the ravine, or abyss, to the other, and this is termed a *taraviti*. When I had dismounted, I went to the tree to which the *taraviti* was fastened, and looked over into the bottom of the ravine; and certainly it was not until some little time afterwards that I resolved to cross. I might indeed have avoided the *taraviti*, by taking the high road by way of Almaguer, but this way was much shorter, and, on the whole, a better road. When the mules were unsaddled they were taken down to a wide part of the river, nearly half a mile below the *taraviti*, where the banks were low, and driven into the river, and where, partly by swimming, and in part by leaping from one rock to another, they reached the opposite bank evidently very much fatigued. On returning to the precipice, I found that the *taravitero* was waiting for me, and, as the muleteer appeared doubtful about the strength of the *taraviti*, I proposed to go over first. I was accordingly bound in the ordinary way to the apparatus, and told by the *taravitero* to go forward to the edge of the precipice, when he immediately pulled the cord, which drew me on to the *taraviti*, and, after an aerial journey of a few seconds, I reached the cliff on the opposite side.†

The muleteer could scarcely be persuaded to take his seat on the *taraviti*, but the *taravitero* at length got over his scruples, by giving him some aguardiente. When the muleteer had crossed, the mules were secured for the night in a piece of land at the base of a lofty cliff, near the river bank.

The *taraviti* of Guanhambu, at the time I crossed it, was composed of six
cords

* Vigne calls it the Huaramba, ii. p. 233.—C. R. M.

† "A tight rope forms the bridge here, on a slope to the lower and opposite bank, so that the traveller and his baggage descended with rapidity."—Vigne, ii. p. 233.—C. R. M.

cords* of salted raw hide, twisted, and dried in the sun. Its length, from the tree to which it is fastened on the southern side, to the one on the northern bank, is 70 yards (English measurement), and is undoubtedly the longest of the few *taravitis* which still exist in South America. A forked stick, resembling the letter V inverted, is placed over the cords, and to the ends of this stick are fastened strips of raw hide, by which the traveller is bound round the waist and thighs. The southern side of the *taraviti* is much higher than the northern one, so that instead of pulling the traveller across, it is necessary to check his progress by a cord of raw hide, which is tied round the waist, in order to prevent him being dashed to pieces on the opposite side. The whole affair has a notably dangerous appearance, and might cause a revulsion of feeling similar to that experienced by some persons on first beholding a place of execution.

On the 28th I left the *taraviti*, and, after passing over a number of ascents and descents, came to the base of a lofty ridge covered with forest; which is the mountain of Veraguas, or La Union. The ascent of this ridge was commenced about 10 a.m., and at five in the afternoon I descended the eastern slope to the village of La Union, which is situated near the base of the ridge.

On the 30th of June I descended a series of slopes to the valley of Patia,† and halted for the night on the edge of a ravine, at the base of a pass called "Salto de Mayo." On the first of July I ascended the pass, which, although of low altitude, is one of the most difficult and dangerous on the Andes. It is mostly composed of black volcanic rocks, which appear like a number of dark pillars, piled horizontally one above the other. The mules had to leap from one to another of these rounded precipices, at one time ascending, at another descending, for a distance of three miles. I traversed the pass on foot (but both hands and feet were in operation many times together) and left my mule to follow, which came springing up behind me with a steadiness and precision almost incredible. About mid-day I reached the edge of the plain, over which I continued to travel until dusk, when a halt was made at the village of Mercaderes.

July 3rd, the march was continued, when after a journey of three miles, the way led down a steep, gravelly slope to a low-lying plain of sand, covered with leguminous trees, through which flows the river of Patia. The mules, on reaching the river bank, at once entered the water, probably on account of the excessive heat; but before they were half way across the water was up to the saddles, and they all began to swim. I therefore returned to the bank, where shortly afterwards I found a negro, with whom I agreed to ford the river. After several attempts, a place was found much higher up, with a hard bottom, but the water was very deep, which rendered the passage dangerous. The river rises from two deep ravines that come out from the Cordillera Orientale, and the passable fords are about 20 yards above the junction of the streams which flow from these two separate ravines. And so, on proceeding a short distance onwards, I found I had still another branch to cross, but fortunately there was a canoe, which ferried me over, while the mules, on being divested of their harness, swam across. There are many lives lost annually in this river, and at the *taraviti* of Guanambu. A halt was made as the day closed beneath some leguminous trees, which form the principal part of the arborescent vegetation of the hot plains.

At two o'clock a.m. of the 4th, I recommenced the journey by moonlight, for the heat during the day was almost insufferable, alike to man and beast. Little lakes and patches of water, dotted over with *Nymphæas* and other aquatic plants, glimmered in the uncertain moonlight, among clumps of low spreading *Leguminosæ*; but, as the day broke, I saw that some of the patches of water were fringed with an interesting vegetation, consisting of a species of *Equisetum* 12 or 14 feet high; handsome variegated *Caladiums*, *Begonias* grew in the shade, and many plants of *Oncidium Papilio* hung from the trees. At about four in the afternoon I ascended a rugged piece of ground on the edge of the plain, and put up at the house of a negro, at a place called "Piedra Rica." The inmates of this establishment were in a complete state of nudity; and the master of the house, a tall negro, about 60 years of age, but remarkably lean and half deformed, wanted to convert the sweating cloths belonging to my mules into a pair of trousers. I may here state that

* The Government order is "that there be not less than eight strong cords in the *taraviti*."

† At the time of the Spanish conquest, the valley of Patia was very densely peopled, but the inhabitants were massacred by Belalcázar. Cieza de Leon describes the valley, and the humane Andagoya tells us that the chief of Patia was very friendly to him.—C. R. M.

that in no other part of the globe is there to be found people possessed of such thieving propensities as the Spanish Americans; and this remark applies equally to president and people, for whatever property a man may possess, or whatever be his station, it forms no security against thieving, lying, or indeed any kind of dishonesty.

July 5th, I left "Piedra Rica," and passed over low hills, composed apparently of clay, and covered by a coarse species of *Gramineæ*. On these hills are a number of gold washings that, owing to the scarcity of water in summer, are only wrought during the rainy season. About five p.m. I halted at Dolores. Dolores is a small village of about 50 houses, and is situated at the base of a ridge of hills which separates the valley of Patia from the valley of Popayan. I slept for the night on the summit of this ridge, whence a fine view was obtained of the plains of Patia and Popayan. Both are plains of great extent, studded with rounded hills, and long, wavy ridges from 20 to 500 feet in height, and surrounded by lofty mountains, whose precipitous fronts, wild, broken inequalities, and immensely deep steep-sided ravines, present to the beholder a landscape undoubtedly one of the wildest and grandest in nature. The surrounding mountains are mostly composed of a kind of slate rock in a state of decay, and easily separable into thin laminæ, but this deposit is frequently covered with black volcanic *débris*, which gives to the mountains a dark, sombre aspect.

On the 7th of July I left the mountain of Dolores, and, after passing over an undulating tract of tropical country, descended to the low-lying plain or valley in which is situated the city of Popayan.* The red gleams of the setting sun shone on the whitened spires and domes of the cathedral and churches, and gave to the city an appearance of splendour which an examination of the interior does not confirm. The houses are similar in construction to those of most other South American cities, being built of mud bricks, which are afterwards plastered with mud mixed with cut straw, and then painted with clay or lime. The streets are paved with round stones carried from the bed of the adjacent River Cauca, and so irregularly placed that they seem to have fallen from the crater of some volcano; and the interspaces and cavities thus afford a place for refuse of all kinds, and stagnant water, which is allowed to remain until it evaporates.

Popayan is famous as being the birthplace of the unfortunate Caldas. Some of his manuscripts, which I had the privilege of perusing, contain an account of his grand discovery in taking altitudes with the thermometer by boiling water, together with lists of plants, and their virtues when prepared in a particular way; and long dissertations respecting the effects of temperature in certain tracts of country on the colour, stature, and intelligence of the different races which people the globe. Caldas spent the greater part of his life in the rich, fertile valley of Popayan, surrounded by clumps of orange and mangoe trees, and large-leaved bananas, in a temperature pleasant but in no degree oppressive, and so he appears to have entertained a great horror of the severity of the winters in Northern Europe, and, in some measure, of its people also. Many of the plants which he records as possessing medicinal properties bear names in the Spanish language. Caldas was shot at Bogota, by order of the Spanish general, Morillo, at the time of the separation of the colonies, and while he was attempting to make gunpowder for the revolutionists.†

On the 7th of July I left Popayan, and proceeded for about three leagues down the eastern bank of the River Cauca, when the way led round to the northeast, close to the ancient Indian village of Paniquita, over low hills of red clay, mostly covered by shrubby *Melastomaceæ* and pipers. Not a single stone or rock was to be seen anywhere, the hills appearing to consist entirely of alluvial deposit. As I travelled farther to the eastward, loftier hills came in view; but the red clay still continued, with its covering of *Melastomaceæ*, pipers, and
brambles,

* Popayan is situated in the beautiful valley of the Cauca, at the foot of the great volcanos of Puracé and Sotara, in latitude 2° 26' 17" N., and 5,800 feet above the sea.—C. R. M.

† Don Francisco José de Caldas was one of the most eminent scientific men that South America has yet produced. He was associated with Mutis in the botanical expedition of New Granada, and explored the Chinchona regions of the Andes from Bogota to Loxa. Caldas was born at Popayan in the year 1770, and from early youth devoted himself to the pursuits of science with untiring energy. He constructed his own barometer and sextant, and, ignorant of the methods adopted in Europe, he discovered the way of ascertaining altitudes by a boiling-point thermometer. Many of the memoirs of this remarkable man are in manuscript, and others are lost to us for ever. He was murdered by the brutal Morillo on October 30th, 1816.—C. R. M.

brambles, which, however, were different species from those seen on the edge of the plain. My intentions were to reach the village of Sylvia this day, but the morning was spent in catching the mules near Popayan, so I remained for the night at a solitary house about an hour's march from the village.

On the 12th I crossed a broad ridge, and proceeded up a valley, in which lies, in a scattered position, the village of Sylvia, which is the principal head quarters of those who buy the Pitayo, Hambalo, Ambalo, Totoro, and Puracé bark. Several miles to the eastward of Sylvia there runs, north and south, a forest-covered ridge of lofty hills, and from the western slopes of this ridge run westward a number of hills of lesser altitude, which vary in height and form, until they gradually subside to the westward, and appear as low swellings, or green undulations, on the edge of the Cauca valley.

One day's journey to the southward of Sylvia, in a deep valley, lies the village of Totoro, and about six hours' journey to the south of Totoro, at the base of a forest-covered slope, from the crest of which rises the snow-covered volcano of Puracé,* with its chimneys of sulphureous vapour, its subterranean fires still burning, is the Indian village of Puracé. As the mules were tired, I devoted some time to the yellow-bark farm of Ambalo, which is only a few hundred yards distant from Sylvia, and whence a considerable quantity of bark was formerly taken out; but the plants are now very small, and so, in many instances, are not worth taking up. The farm of Ambalo is of considerable extent, but there is little cultivation, because the ridges are very steep, and even present low cliffs of rock in several places. The land was originally covered with forest, but the greater part has been cut down for grazing purposes, and I observed that in places where cattle fed, although the ordinary shrubby vegetation abounded, there was no Chinchona. I searched this place for two days, and also farther to the southward, near Totoro, but obtained only a few seeds, as the land is easily searched, and lies near to the dwellings of the Indians, who never allow the plants to attain any size. The Cascarilleros, who are mostly Indians, assured me that not a single tree was to be found in the Pitayo forests, and that the tallest plants met with were not more than six feet high. I was so much disheartened by this information that I thought of removing with my mules to Totoro, and continuing the search round that place and Puracé. Besides, the seeds had approached maturity, for many of the capsules had burst open, and this circumstance increased my anxiety, because I had hopes of getting together a collection, by patient searching, if I went towards the south, while, on the other hand, I was aware that the Chinchona of Pitayo was superior to all the others, and brought the highest price. And so, if I went to Totoro and Puracé, I would lose the seeds of Pitayo; but again, the chance of seeds at Pitayo was not great, and if I went there I might search all the forests and find none, and on my return to Puracé get nothing but empty capsules. However, after some consideration, I resolved to go on to Pitayo, and if I only found one single panicle on any of the trees, to form an encampment on the spot, and remain there until it was well ripened, and thus make sure of at least a few seeds of this much-esteemed species.

Accordingly, on the 15th of July I left Sylvia by daylight, and proceeded eastward towards the base of the lofty forest-covered ridge of hills which runs north and south to the eastward of Sylvia; and after a rapid journey of two hours over rising grounds, came to the ascent, which winds in a zigzag manner to the summit of the ridge. On ascending about 200 feet I saw a young plant of Pitayo Chinchona, about 18 inches in height, and higher up several more were met with, almost equally small. The surrounding trees of the forest here were low and spreading, but this habit is assumed by almost all trees

* Humboldt and Bonpland visited the volcano of Puracé in November 1801. Humboldt says that, on ascending the volcano, at an elevation of 8,500 feet, there is a small plain inhabited by Indians, and cultivated with the greatest care. This delightful plain is bounded by two very deep ravines, on the brink of which precipices the houses of the village of Puracé are built. Water springs out profusely from the porphyritic rock, and every garden is enclosed by a hedge of euphorbiums, with slender leaves of the most delicate green. The contrast of this beautiful verdure with the chain of black and arid mountains which surround the volcano, and which are cleft and torn asunder by earthquakes, struck Humboldt as most agreeable. Puracé is celebrated for the beautiful cataracts of the River Pusambio, the waters of which are acid, and are called by the Spaniards *Rio Vinagre*. Humboldt made a sketch of these falls (*Vues des Cordillères*), as they are seen from the garden of an Indian of Puracé, which is extremely picturesque.—C. R. M.

trees on the Andes at high elevations, and is, according to Humboldt, influenced by the amount of atmospheric pressure.

On reaching the summit of the ridge, I travelled for about an hour over a comparatively level tract of forest-covered country, having on the right a high frowning precipice, and on the left an immensely deep ravine. This is the *Piñon de Pitayo*. Large masses of stone lay scattered about among the trees and portions also of a brittle slate rock, of which the hill seems to be composed, had fallen from the cliffs above, and, like the slate rock all over the Andes, is in an advanced state of decay. A thick undergrowth prevailed, consisting of some beautiful blue and yellow flowered chinchonaceous shrubs, a species of *Smilax*, brambles, and a great abundance of *Pteris aquilina*. The *Piñon de Pitayo* has an elevation a little over 8,000 feet. The elevation was taken with the thermometer by boiling water, 604 feet being allowed for every degree of Fahrenheit. The Chinchona was found growing here, and on the cliffs which rose high on the right, and likewise near the bottom of the deep ravine to the left. The finest Chinchona bark has been got from the precipices on each side of the road, but especially from those on the right. I ran into the forest every few yards, but only found little heaps of peeled plants from two to three feet in length, and some of them were not thicker than a writing quill.

On leaving the Piñon, the way led down the eastern slope of the ridge, and descended over steep declivities of slate rock to a circular valley, in which is situated the village of Pitayo. The valley is surrounded by high conical hills and long, wavy ridges, on the summits of which are bare grassy *paramos*, but lower down are cliffs of slate rock, below which spreads out a dark, sombre forest that extends to the bottom of the valley. The day was far spent when I entered the village, for I had delayed a considerable time on the Piñon, and the declining rays of the sun were only visible on the rugged precipices and black masses of rock that adorn the summits of the mountains to the eastward. I had previously learned that there was only one white man in the village. On entering I saw a white man seated in a corridor turning some Chinchona bark which had been placed there to dry. I asked him whether he could oblige me with a corner of his house for a week; to which he replied that he had a little dark room in which was a quantity of Chinchona bark and some wheat; if I liked it I might put my things therein. On looking inside I said it would answer well, for, although the sleeping place was, as heretofore, on the ground, still it was dry, a circumstance which I valued very much. On entering into conversation with this person, he informed me that he was the magistrate of Pitayo, and asked if I had come to buy Chinchona bark. I said I would like to see some, but, besides, I had other diligences.* He inquired very anxiously if I had brought any tobacco, when I told the muleteer to bring a small bag which contained this article, and made him a present of three large leaves, which he said he "appreciated almost as much as his life." Subsequently I learned how very scarce the Chinchona trees were in the forests of Pitayo, indeed he informed me that there were no plants much larger than those I had seen on the way, but added that his two sons, young lads about 18 years of age, had been collecting bark in the forests for nearly three years, this being the only occupation they could pursue, in order to escape the military conscription, and that when they came home I could obtain every information from them. Shortly after nightfall they arrived, each carrying a large knife or *machete*, and a bag containing about six or eight pounds of green bark. I was informed by these two lads that the only trees of any size in the Pitayo region were in the possession of two Indians, one of whom lived on the brow of the hill immediately above the village, and the other below the edge of the Piñon de Pitayo. I was previously aware that three kinds of bark were supposed to exist in the Pitayo and surrounding districts, under the names *red* or *canela*, *yellow*, and *white*. The *red* commands the highest price, as the foreign buyers in Sylvia find, after repeated trials, that it yields the greatest quantity of quinine, the *yellow* is held next in estimation, while the *white* brings the lowest price of all. The *red* or *canela* is only found in the surrounding forests of Pitayo and the Piñon de Pitayo; but the *yellow* has a much wider range, as it is collected on the farm of Ambalo, and around the village of Hambalo, which is near Pitayo, and likewise at Totoro.

On

* *Otras diligencias.*

On the 16th of July I rose early, and after having looked to the mules, took the muleteer with me, and commenced the ascent of the hill slope immediately above the village, where one of the Indians who possessed Chinchona trees was said to live. The ascent was along the edge of a ravine for about two hours, when, on reaching the brow of the hill, the Indian's hut was descried close at hand, surrounded by patches of barley, wheat, and potatoes. On reaching the hut, the barking of the house-dog brought the inmates to the door, and an aged Indian beckoned me to enter the dwelling. Although the domicile was small, there were four or five families living in it, all probably related to each other, who spoke the *Paez* language,* not a single word of which I could understand. Fortunately, however, some of the elder members of the hut understood a little Spanish. Before entering the hut, I observed several Chinchona trees within an enclosure behind it, and I now requested permission to look at them, which was granted. I accordingly entered the enclosure, accompanied by the Indians, and found there were four young trees, about 15 feet high. One of them was well laden with capsules, some of which had already burst open, and the greater number would probably do so in two or three days. After looking attentively at the trees, I offered the Indian about one shilling if he would allow me to gather the capsules, and the money was at once accepted. A light Indian boy was then directed to mount the tree, who, as instructed, broke off the panicles and put them into a bag which was held up to receive them. A good number of the capsules were small, and the seeds they contained would not come to maturity, but after rejecting these, I had 450 well-ripened capsules. The other trees, although about the same size, had only a few panicles, which were small and green, and not worth collecting.

This place, which was scarcely a mile to the southward of the Piñon, had nearly the same elevation, and is backed by the same steep ridges of rocks that were seen on the right, on crossing the Piñon de Pitayo. The soil around was a dark brown friable loam mixed with small pebbles, and having a substratum of loose rock, which in some places was of volcanic origin, and in others appeared as a kind of slate of a deep bluish colour. In some parts the surface soil very much resembled peat; it was almost black, and of a very spongy nature, and consisted probably of decayed trunks of trees and the shrubby hard-foliaged species of Chinchona which prevail mostly at high elevations on the Andes. In the surrounding forest there were open spots where there were but few trees, but in such places, and on the brows and slopes of the ravines which furrow the hill, the common fern, *Pteris aquilina*, formed thickets, through which it was necessary to cut away before any progress could be made. The colour and depth of the soil differed in several places, from light brown to nearly black, and from a few inches to three or four feet in depth, but in all such situations the general vigour of the Chinchona plants appeared to be the same. This Chinchona, like all the other quinine-producing species I have become acquainted with throughout the Andes, is always restricted to dry slopes or hollows, and is never found in wet ground: so that in cultivating the Chinchona this point should be particularly attended to.

When all the good capsules had been secured, I desired the Indian to sell me one pound of bark from the tree whence the seeds were taken, to which he demurred, as he thought it would kill the tree, but said, if I liked he would take up some suckers, which came from the root, none of which were thicker than a common walking stick. As there was no other hope of getting specimens, and as my friend, Professor Jameson, of Quito, had charged me to be sure and bring some for analysis, I assented, and several of the younger Indians were immediately set to work with knives and *machetes*, when, on clearing the earth away from the base of the suckers, they dug them up by the roots, and then handed the plants to an old Indian, who barked the roots and the lower portion of the stem. The barking is rather tedious work, for, unlike all the other Chinchonas I have seen, the bark cannot be taken off in lengths of a foot or so, but breaks away in little chips about two or three inches in length, a circumstance which may in some measure account for its superior quality. A small patch of maize and potatoes,

near

* Cieza de Leon says that "to the eastward of Popayan is the extensive province of the Paez Indians, who have worked so much evil to the Spaniards," and he goes on to give a very interesting account of them. —See my translation of Cieza de Leon, p. 116.—C. R. M.

near to the Chinchona trees, had suffered from a late frost, which testifies that this Chinchona will bear three or four degrees of frost without being injured in any way. The thermometer here in the morning stood at 45 degrees Fahrenheit, but below, at the village of Pitayo, it was five degrees higher, showing that this Chinchona, like all the others that grow at high elevations, enjoys a considerable range of temperature. I searched all the trees for specimens in flower, but only found one branchlet bearing a panicle in bloom. At the close of the day I returned to the village, and found that the Indians had during my absence lodged a complaint against my mules, saying that they would eat up all the herbage in Pitayo. The cleared land is held in common by all the Indians; and as people from other parts rarely visit Pitayo, no provision is made for the accommodation of more animals than those belonging to the inhabitants of the village.

The Indians of Pitayo speak the *Paez* language, which is quite distinct from the *Quichua* of the Indians of Ecuador, Peru, and Bolivia; and what appears more strange, it is said to have no relation whatever to the language *Guambiana*, which is spoken by the adjacent Indians of Sylvia, Totoro, Paniquita, and Puracé.*

To the eastward of Pitayo lies a wild mountainous tract of country called "Tierra adentro," *i. e.*, land within, which is said to be thickly populated by Indians, whose numerous tribes speak five idioms besides the *Paez* language. The Indians of "Tierra adentro" are declared to be cannibals, which I do not believe, although all those from this region that I have yet seen presented a very formidable aspect, and appeared quite capable of devouring their fellow Indians, or in fact any one else. The tribes are perpetually at war with each other, and they are the most vindictive Indians in equinoctial America. On their journeys through the forest they always travel in a single line, one behind another, every one treading in the footsteps of the first; and by this method the danger of snake-bites is, in a great degree, diminished. Although there are many salt springs throughout this vast territory, yet the Indians derive no benefit from them, being entirely unacquainted with the use of salt as an addition to their food. They all carry the blowing cane and a bunch of short arrows in a sheath, the points of which are poisoned with a substance which is probably one of the most virulent poisons in existence. It is prepared by the Indians from the root a climber, which from their description I suppose to be a plant belonging to the order *Loganiaceæ*: the root is bruised, macerated in hot water, and strained. The residue is afterwards boiled down, until it acquires the consistence of molasses, when on cooling it becomes hard and black, and looks like a piece of opium. Direct exposure to the air for any considerable length of time is said to destroy its active properties. The Indians, therefore, carry it in a very small earthen jar, or in a piece of jointed bamboo, which is carefully stopped, so as to exclude the air. When they wish to apply it, a small portion is held near to the fire, when, in about a minute, it becomes soft like wax, and the points of the arrows are then rubbed upon it and placed in the sheath. The moment one of these arrows strikes a wild hog, monkey, or fowl, they appear to be seized with spasmodic convulsions, which, however, only last for a few moments, for they almost instantly expire. No bad results follow on eating venison which has been procured in this way, so that it may be taken internally without injury. Strange enough, certainly, that these savages, who know nothing of the principles of chemistry, should be capable of manufacturing an article the active powers of which, in one way, seem greater than even those of *aconite*.

On the 18th of July I left Pitayo, and recrossing the Piñon, descended to Sylvia, which was the only place in which there existed pasture for my mules, and where food, scarcely sufficient to maintain a bare existence, could be procured.

On the 19th I left Sylvia on foot, and searched a mountain to the north-west of the Piñon, but although a few plants were met with, they were all too small to bear seeds.

On the 20th I again left Sylvia on foot by daybreak, taking with me two days' provisions, and directed my course to a ravine which runs along the base of the Piñon, where the other Indian, who, I was told, possessed Chinchona trees,

* These Indians are descended from the ancient Coconucos, of whom Cieza de Leon gives an account. See my translation of his *Cronica*, p. 115.—C. R. M.

trees, was said to live. This Indian's name was Almendrez, and the magistrate's sons in Pitayo informed me that he lived in some part of the ravine, although the exact locality was uncertain, as he had several clearings at considerable distances from each other. After several hours' journey I reached the ravine, and travelled along its edge through thick primitive forest for about an hour, when I suddenly came out on a small clearing, which was sown with maize and wheat. On looking about for some time I discovered a house in a hollow, near the edge of the forest. On reaching this dwelling I found it to be a hut of very humble dimensions, deserted, but containing a stone for grinding grain, and three old black clay pots, which had been fashioned by the hand and dried in the sun. From the hut I again plunged into the forest, and after travelling eastward along the edge of the ravine for another mile, or more, I discovered a house in a hollow near the edge of the ravine, whence a considerable amount of smoke was issuing, and around the house grew a number of Chinchona trees, which, in order to show that they were private property, were encircled by a fence. I immediately looked out for a large stick, to combat the dog which might be expected to sally forth on approaching the house, and getting over the fence, went straight to the dwelling, and called out the ordinary salutation, to which there was no response made. I therefore inferred that there was no one within, and so proceeded to examine the Chinchona trees, the largest of which, although standing, were peeled, and their leaves were already beginning to turn brown and fall off. A good number of capsules, just bursting, were observed on some of the younger trees, which had not been barked; and, after instructing the muleteer to bring the seed bag, I was about to break off some of the finer panicles, when the Indian entered the clearing, and shouted to me, believing, I suppose, that I was stealing his Chinchona bark. On going up to him, I explained the object of my visit, and after making him a present of two pieces of bread and some tobacco, offered him about 2s. if he would allow me to collect the capsules from the trees, to which he agreed. When the Indian had devoured the bread, which was considered a treat of no ordinary kind, I entered into conversation with him respecting the origin of the plantation, and why the trees had been peeled standing. He informed me that about four years ago, on cutting down a portion of forest where his house now stands, he found a great number of young Chinchona plants, which grew so thickly together, that it seemed as if they had been planted (*sembrado*), although such could not be the case, as the forest cut down was of primitive origin; and that, after erecting the house, he enclosed the plantation with a fence, hoping in a few years to get several *quintales* of bark from it, for the bark even at this time was no longer procurable in large quantities. The trees continued to thrive well until a few days previous to my visit, when one night of clear moonlight, while the Indian was staying at a little clearing which he had farther up the ravine, several persons had entered the plantation, and divested all the finest trees of their bark, both from trunks and roots. The thieves were believed to be *Cascarilleros practicos*, most of whom sleep in the forest, and it was supposed that they had been hovering around the dwelling for several days, waiting for a favourable opportunity.

I was nearly an hour occupied in collecting the capsules from the different trees, some of which contained the finest seed I have ever yet collected on the Andes. On finishing the work, I returned to Sylvia the same day. As I knew the natives were jealous concerning the Chinchona, I resolved to dry the seeds in as quiet a place as possible; therefore I left Sylvia on the 23d, and put up at a farmhouse called Miraflores, a little way below Totoro, and close to the road that leads over the *paramo* of Guanacas, to the valley of the Magdalena. On reaching Miraflores I carried the seeds in a piece of cotton cloth to the side of a ravine, where there was not much wind, and spread them out to the sun, for there were still a considerable number of capsules which had not burst open, but in about eight days the greater number did so, and then the collection in all contained not less than one million and a-half of seeds. If, however, I had been six or eight days later I could not have gathered a tenth part of this collection of seeds; for the grand harvest was procured from the trees on the edge of the Piñon, many of the capsules of which were at the time just bursting, and so were in the best possible condition for collecting. Shortly after I made the collection, the Indian, finding that many of the larger trees which had been

barked would not recover, rooted up the plantation and sold the bark. When the seeds were well dried, I picked out the greater number of the capsules and threw them away, reserving only a few among the seeds, in order to keep them open and allow a free circulation of air. I next occupied myself in taking the temperature of the Chinchona region around Totoro. It will be understood that when any plant is found growing on a mountain slope, from the base to near the summit, that the plants growing near the base, although of the same species, enjoy a milder temperature than those near its crest. This, therefore, is the case with the *Pitayo Chinchona*. It enjoys a wider range than the red bark, which is mostly (although not always) found growing where coffee, cotton, and sugarcane may be planted; while the Chinchona of Pitayo is found growing in that elevated region where wheat, barley, and potatoes can only be cultivated. Near the upper limit of the Chinchona neither wheat nor potatoes can be well grown, and even the barley is thin and dwarfish. The temperature at the lowest limit of the Chinchona rose during the hottest days to 59° or 60°, but at night fell to 46° or 48°, and at certain periods of the year it might fall to freezing point. The thermometer at the upper limit, which was near the edge of the *pajonales*, where the forest was particularly low and stunted, ranged during the day from 44° to 48°, and fell at night to 35° or 36° Fah. Although it did not happen during my stay in this locality, yet I am certain that the temperature in this higher region not unfrequently falls during the summer season three or four degrees below freezing point. My own opinion is, therefore, that this Chinchona should be planted in situations where, in the dry season, the temperature may fall occasionally three or four degrees below freezing point, and where the daily variation in the dry season will be eight, ten, or twelve degrees. In the rainy season the temperature in the Chinchona forest does not often fall below freezing point, nor does the daily variation exceed three or four degrees, but this is attributable to the watery exhalations which fill the atmosphere, and prevent a rapid circulation of air from the summits of the lofty mountains.

During my travels on the Andes I have found, after many trials, that the temperature of any locality cannot be correctly calculated by merely taking the altitude. Thus I have found the wild potato growing near the summit of a mountain in stunted forests, at an elevation of 11,000 feet, while around Loxa I never saw it much above 8,000 feet. The mountain alluded to, however, was bounded by hot plains, whence the heated atmosphere ascended the deep ravines which furrowed the slopes, and thus modified the temperature of the loftier regions. In order to have obtained a general idea of the temperature of the Pitayo region, I should have remained there for the space of one year, during which time I would have been able to register the temperature of the wet and dry seasons; but in the present case this could not be accomplished, and, besides, although such a register would have been interesting, it is not absolutely necessary; for, as already shown, this Chinchona enjoys a considerable range of temperature, which is indeed requisite for its existence and development; and on looking at the circumstances under which it flourished with a practical eye, on the day I crossed the Pitayo mountains, I felt perfectly satisfied that it would succeed on the Neilgherry hills of India.

With respect to the rainy period of the year, I was informed that the rains commenced in November, and ended in April or May. The intervening months of summer are not perhaps without occasional showers, but there cannot be a great abundance of rain, for the grass on the cleared lands is burnt every summer, in the same way as that on the summits of the Neilgherries. On the forest-covered slopes the ground is naturally more moist, because evaporation is considerably retarded by the mass of green foliage which covers it, and besides, in the forest the ground is covered with fallen leaves, which are gradually decomposing, and thus preserve the humidity of the soil and atmosphere.

The general vegetation of the Chinchona region, apart from the arborescent vegetation,—some of which was new to me, and moreover was not determinable, as few of the trees were in bloom,—consisted of pipers, solanums, blue and yellow flowered chinchonaceous trees and shrubs, brugmanzias, fuchsias, escallonias, berberis, two species of smilax, calceolarias, menthas, a new species of gunnera, salvias, ranunculus and composites. The bulk of the cryptogamous vegetation consisted of *Pteris aquilina*, which is very abundant, and which I saw also on the Neilgherries, lastreas, polystichums, blechnums, aspleniums, lomarias or braineas, cystopteris,

cystopteris, gleichenias, hymenophyllums, and jamesonias. Several species of selaginellas, and two species of lycopodiums, were found on the banks of ravines in deep shady places.

The winds in summer are often very violent and strong, but do not appear to be injurious in any way to the Chinchonas. During my stay there was generally bright sunshine in the daytime, and towards evening it became cloudy; but the forests were very rarely enveloped in mist, which lay high up on the grassy *paramos*, far above the forest limit, although a little before dusk there was sometimes a very light drizzly shower, which lasted for about half an hour or less, and was usually succeeded during the night by very heavy dews. In clear nights it was observable that the deeper ravines on the forest-covered slopes often became filled with a white vapour, which, however, was perfectly stationary, and rapidly disappeared with the first rays of the morning sun.

The Chinchona plants are sometimes seen growing on gentle declivities, but they are found much more frequently on very steep slopes, such as the banks of ravines and precipitous hill slopes. I have already referred to the fact that three kinds of Chinchona are believed to exist in Pitayo and the surrounding districts, under the names "red or canela," "yellow," and "white," the first mentioned of which is declared to be the best. In packing, however, the three sorts are thrown together and beaten nearly to a powder, and then put in bales. The three kinds do not differ in habit of growth in any particular, nor even in the colour or structure of the inflorescence, and as far as could be observed they all grow at nearly the same elevation, and enjoy the same range of temperature, although apparently not the same amount of moisture. The white bark has a pale yellow colour, and, to an unpractised eye, does not appear different from what is termed the yellow kind, and in fact I believe it to be exactly the same. The white bark grows around the base of the snow-covered volcano Puracé, which is almost perpetually enveloped in storms of rain and hail, and a portion of these tempests in general extend to the Chinchona forests of Puracé. To the northward of Puracé, on the same ridge of mountains, occurs what is termed the yellow bark, which certainly shares little of the storms from the snow-covered volcano; and further north still is the Pitayo variety or species, which, as it is situated at a considerable distance from Puracé, appears to escape the tempests which impinge on the forests to the southward. I attribute the pale colour of the Puracé bark to the excessive amount of moisture it receives. The exterior of the Pitayo bark is yellow, and the inner surface appears yellow also, but if attentively examined a reddish stain is seen on the inner surface, and this forms the distinguishing point between the Chinchona of Pitayo and that of Totoro and Puracé. This difference, although of a slight nature, is always constant; and as that of Pitayo steadily yields a greater per-centage of quinine than any kind in New Granada, and as quinine can be obtained from it at a much earlier period of growth than from the other kinds, it seems well entitled to be considered as a distinct species.

Most persons who have written on the Chinchona of the Andes, represent it as flourishing amidst perpetual torrents of rain and thick mist, without scarcely ever enjoying a moment of sunshine. Now, I have been in localities on the Andes which had altitudes similar to that of the cold Chinchona region, where only a species of *Solanum* would grow, and which looked as if on the point of extinction, from the abundance of mosses which covered it, that besides hanging in long strings from the trunks and branches, twined round the smallest shoots to the very points, and appeared to retard the development of the few leaves which crowned the terminal branchlets. In these localities the mosses were continually dropping water, and heavy showers fell almost every day, while during the night the rain came down in perfect sheets, shrouded in a thick mist, which rarely dissipated until midday. No Chinchona could live in such a climate, nor even if planted in similar situations could the trees ripen their seeds, for a certain amount of dry weather and sunshine is necessary for the ripening of the capsules, and for their bursting in order that the seeds may fall to the earth. The Chinchona climate is certainly moist for about six or eight months of the year, and in cultivating this plant it is expedient to seek very humid situations, because the mountains of India do not appear to receive the same amount of moisture as the lofty elevations in America. Nevertheless it will be understood that the natural climate of the commercial Chinchona has been misrepresented by most South American travellers.

The *Pitayo Chinchona* differs essentially from the *C. lancifolia* of Karsten in being a more slender tree, often found formerly from 60 to 70 feet in height; but such trees were rarely more than 18 inches or two feet in diameter, with very slender branches, bearing small lanceolate leaves, which before falling always assumes a purple or deep red colour. The *C. lancifolia* to which Karsten refers extends over a wider tract of country than any other Chinchona on the Andes. This tree, however, is much more massive, and bears considerably larger leaves than those of the *Pitayo Chinchona*. This large-leaved Chinchona inhabits the western slopes of the Cordillera Orientale, in situations presenting conditions favourable for its development, between Pasto and the city of Santa Fé de Bogota; while the finer kinds of Pitayo bark are limited to a few square miles of steep forest-covered slopes to the northward of the volcano Puracé, which belongs properly to the central Cordillera. The map of the Chinchona region of New Granada lately made for Dr. Weddell is nothing more than a piece of superfluous paper covered with errors, because it represents certain tracts of country as mountainous, and covered with Chinchona forests, while such tracts really exist as hot arenaceous plains or savannas covered with low spreading leguminous trees, where no Chinchona ever grew, and very probably never will, unless indeed a general upheaval of such tracts of country should take place.

Karsten states that the bark is not taken from the roots of the *C. lancifolia*, which in most instances is true; but this is not the case with that of Pitayo, the bark from the roots of which is much more valuable than that from the trunks or branches. Further he asserts that the *C. lancifolia* is never likely to become scarce, and that the continual cutting of the Chinchona trees will rather augment than diminish the number of plants, and this may be true concerning his *C. lancifolia*, about which no one cares much, as the yield of quinine is often too small to cover the expense of collecting; but as regards the Pitayo bark there is one thing very certain, that at the present time there is more difficulty in collecting one pound than there was formerly in collecting one hundred weight.

The Pitayo bark will very probably be found the best of all the species for cultivation, as it is said to grow very rapidly, which is a matter of great importance. It may certainly be barked when it is six feet high, although it would not be an advisable practice to do so before the trees are at least 30 feet high. Bark taken from large trees in Pitayo was said to give nearly four per cent., while bark taken from the roots of the same trees gave five per cent. of quinine.

I was informed by the foreign dealers in Sylvia that all the bark taken from Pitayo is sent to France. The bark sold in England under that name is not true Pitayo bark, but comes from the mountains which border on the valley of the Magdalena, and from Almaquer and Pasto, and is certainly from the *C. lancifolia* of Karsten, which as regards quality is very inferior to that of Pitayo. True Pitayo bark may be known in England by not being much thicker than common window glass, because it is all taken from small plants, the large trees having been destroyed long ago, and by its being full of earthy particles, on account of so much bark being taken from the roots of the plants. The Chinchona alluded to by Karsten is rarely collected when less than one-fourth of an inch in thickness; but I have sometimes seen it nearly an inch thick after the epidermis had been scraped off.

On the 7th of August I prepared to march for the city of Santa Fé de Bogota, by way of the *paramo* of Guanacas, for although the route by the Quindiu Pass was preferable, it was not open at the time, on account of a revolution which was going on in the Cauca valley. Guanacas is a word belonging to the Indian language Guambiana, and is said to imply an impossibility, or the performance of anything accompanied with great risk or difficulty. And so, on inquiry, I was informed that no one could cross this mountain ridge during the months of July, August, and September without suffering severe hardships and running the risk of perishing in the storms which prevail on the *paramos* during these three months. Nevertheless, I resolved on taking this road, because by doing so I should be enabled to determine the character of the Chinchona which is taken from the mountains on the edge of the Magdalena valley, and thus form an acquaintance with all the Chinchona localities of New Granada. I was not able to procure a guide for the *paramo*, for all the able-bodied inhabitants, including Indians, had been taken for military service, and so I was obliged to trust to the experience I had gained in making out solitary and intricate paths on the Andes.

In securing the seeds, I first put them into a bag of cotton cloth, and then wound about two yards of the same cloth round the bag, which was afterwards placed in another bag of double india-rubber cloth, perfectly waterproof, and strapped behind the saddle. My reason for rolling so much cloth round the seed bag, was to prevent the seeds from sustaining any injury from the india-rubber cloth, or from the atmosphere, while crossing the *paramo* of Guanacas. From this time until the day I delivered the seeds I inspected them daily, lest they should be attacked by mildew.

On the 8th of August I left the farm of Miraflores, and after an hour's journey to the north-east passed through the village of Totoro, and commenced the ascent of Guanacas.* The way led directly up the mountain slope, which was covered with low stunted forest, until a crest or ridge was reached which had an elevation of 12,000 feet, whence a large tract of *paramo* is seen at a slightly lower elevation, diversified by patches of shrubs, lagoons, and long ridges of low hills, on which grew a species of *Stipa*. The way led over this tract of country until about 3 p.m., when I came to the *tambo*† of Gabriel Lopez, which is merely an open shed standing in the middle of a quagmire, on the edge of a clump of forest. An hour before reaching the *tambo* a tremendous storm of rain fell, so that ere my arrival I was drenched to the skin, without being able to change my clothing, for, as the *tambo* was without walls, the tempest swept furiously through it, and would have wetted me afresh even if I had put on dry clothing, which was more necessary for the following day. Shortly after reaching the *tambo* a party of soldiers, six in number, came to it from the eastward in a most exhausted state. They informed me that two of their companions had died from cold while passing the *parte peligroso* (dangerous part), and strongly advised me to return to Totoro, and remain there for three days until the tempest should calm down.

Next morning at daybreak the mules, five in number, were put in order, and I left on foot, keeping a few yards in advance of the muleteer, who was mounted, and who brought up the animals at a smart trot, while I busied myself in keeping ahead and in finding out the road, which in some places was a work of difficulty, from the abundance of long grass which covered the slopes and marshes that had to be traversed. The morning of this day broke through dense masses of dark fog, which was now succeeded by a tempest of wind and rain more fierce than that of the previous day.

After leaving the *tambo*, the way took a south-easterly direction over irregular rising ground for three hours, when, after passing through a patch of low stunted forest, I found myself at the base of an elevated platform of volcanic rock covered with loose stones, which is the "*parte peligroso*," the loftiest part of the road on the Guanacas. At this point I mounted, and in a few minutes the summit of the platform was reached, over which swept the cold wind and rain, and dark clouds of mist, with such violence that the animals were at times nearly brought to a standstill. Close on the right was seen a small lake (La Laguna) which might cover an acre of land,‡ to the southward of which runs a long range of snowy mountains that compose the volcano of Puracé, which is well termed by the Indians the "*Crying Mountain*." About 100 yards distant on the left rose a tall pyramidal hill, on the summit of which is another lake, of very small dimensions, of red water, which probably has some connection with the volcano. As I passed hastily along, I saw the bodies of the two soldiers who had died on the previous day, covered with large stones, and both sides of the road was thickly whitened with the bones of men and skeletons of horses and mules. Before I was half way across this platform the cold wind and rain produced the most alarming symptoms in the mules, and the one on which I was mounted

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* "From Totoro begins a terrible ascent, in some places over steps in a corduroy road, the bones of numerous mules attesting its severity. The pass would be inaccessible for baggage-mules but for this corduroy road. Ulloa says that this, of all the South American passes, is the most famed and dreaded."—*Vigne*, ii. p. 248.

Caldas thus describes the *paramo* of Guanacas:—"It is in 2° 30' N. lat., and, commencing at the town of La Plata, has a westerly direction. It is only 18 leagues long, but it takes seven days to go over them. It is necessary to cross the three rapid rivers of La Plata, Río Negro, and Ullucos, and to ascend and descend precipitous mountains. I have myself crossed over this pass no less than seven times."—*Semanario de la Nueva Granada*, p. 25.—C. R. M.

† The Quichua word for an inn.—C. R. M.

‡ "On the top of the pass there is a small lake, from each side of which flow tributary streams of the Cauca and the Magdalena."—*Vigne*.—C. R. M.

was rapidly becoming stiff, and refused to go on, when I called to the muleteer to bring my spurs. He replied that they were in the saddle bag, and that he could not take them out. On looking round I saw that he was almost powerless from the cold, although he was well covered up, and had on my long boots, while I travelled with a pair of sandals made of the fibre of *Agave americana*, which were already well soaked with water. On seeing the exhausted state of the muleteer, and that the mules refused to proceed, I dismounted, and told the muleteer to do so instantly also, and cut open the bag with his knife, and take out my spurs. The spurs were quickly got out, I sat down on a sepulchre to put them on, leaped from another on the back of the mule, and then with the spurs, and the point of a long knife, which the muleteer was directed to use also, the animals were brought to a gallop, and in a few minutes reached the descent on the eastern side. If I had been in London, I dare say I might have been fined for the treatment I gave to my mules, but the streets of London are not like the *paramo* of Guanacas; and so, by administering to the animals a little severe chastisement, I escaped from the deadly blast that swept over the "parte peligroso," where if the muleteer had remained five minutes longer, he would certainly have died. I was myself considerably frightened, and although I have crossed several of the loftiest passes in America, I would again prefer any of them to the pass of Guanacas. I was not able to determine the elevation, but I have little doubt that it does not exceed 14,000 feet. Why the atmosphere should prove so peculiarly destructive to human life at this elevation I cannot say, but it is surely something marvellous, for the edges of the lagoon are fringed with low stunted shrubs and stipas, and in clefts of rocks, beside a rivulet that comes from the lagoon, and which is the source of the river Paez, grow species belonging to familiar genera of cryptogams, lastreas, aspleniums, polystichams, lomarias, blechnums, and jamesonias.

The descent on the eastern side was the steepest I have ever seen, and the way for a considerable distance led along the side of a rushing torrent. On proceeding a short distance downwards, orchids were observed in great abundance, and lower down palms and tree-ferns were seen waving above the general forest. The road for the first two miles of the descent was irregularly paved with large stones, but on reaching the hot forest it is paved with trunks of trees, which are both difficult and dangerous to travel over, especially in steep places.

At about three in the afternoon I reached the "coral," which is an open spot on the banks of the Paez, almost entirely walled in by the most tremendous overhanging precipices I ever witnessed. Some idea of their height may be formed when I state that the summits are nearly as high as Guanacas, and appear as grassy *paramos*, while at the base of the precipices along which I travelled, grew palms and other tropical plants. On their lichened fronts, which were continually dropping water, hung selaginellas in long curtains, begonias, achimenes, orchids, and large bunches of lycopodiums. The Indians who cross the pass mostly sleep here for the night, but as the precipices looked as if about to tumble down, I was very glad to get away from under them, and proceeded to the next *tambo*, called La Ceja, which was about three leagues distant. I came to La Ceja about dusk, and found the *tambo* without inmates, but there was plenty of firewood, and, after changing my drenched clothing, a large fire was kindled, which the muleteer, with the remembrance of his recent starving on the *paramo*, continued to keep up until dawn of day.

On the 10th the march was resumed, when, after a number of ascents and descents in mud which reached to the knee, I came to the pass of the Rio Paez, which, from the number of auxiliary streams it receives before reaching this point, is a large foaming river, across which the mules had to swim, but I was obliged to crawl over the Indian bridge a little lower down, which was decidedly the most miserable structure of the kind I ever saw. It consisted of a network of climbers, stretched across the river, and fastened to trees that grew on projecting cliffs on each bank. There were no side cords or anything to hold by, which rendered it necessary to move with the utmost caution; nevertheless the passage is most unpleasant, for, as soon as one gets on to the apparatus, it begins to swing so much from one side to the other, that when the middle is reached the motion is violent enough to precipitate the traveller into the boiling
gulf

gulf below. About four in the afternoon I reached the village of Inza,* which is built on a little green table-land, on each side of which are deep ravines. The climate is hot, producing sugar-cane and plantains.

On the 11th I journeyed along the southern bank of the Rio Paez, over a grand picturesque country of lofty precipices of stratified rock, and deep ravines, most of which were dry or contained very little water. The strata in most instances was a slate rock, in a highly inclined or vertical position, whitened with lichens, but bare or thinly covered with soil, that, however, bore a number of very interesting plants, among which were observed several very beautiful *Malvaceous* shrubs and large flowered *Lælias*. The mountains seen on the right during this day's journey, run in a massive ridge eastward from Guanacas, and present the steepest slopes I have ever seen in any country. Existing as a lofty range of grass-covered conical elevations of vast extent, and mostly inaccessible even to the Indians, it appeared a matter of regret that such an extensive tract of country could never become available for the purposes of cultivation, or in fact for anything else. About five in the afternoon I halted at La Topa, which is merely a few houses, built at the confluence of three ravines, whose waters fall into the Rio Paez.

On the 13th I left La Topa, and journeyed for three hours along the edge of a precipice where there was scarcely room for the animals to tread, when the way came out on a wide plain or llano, on the eastern side of which is the city of La Plata, where I arrived about dusk. La Plata is scattered over a grassy plain on the southern bank of the river of La Plata.† The population is a mixed race of Spanish and Indian origin, and have their bodies marked with white and brown spots, which they attribute to the water. This, if true, seems very remarkable; for the adjacent hills and elevations are composed almost exclusively of limestone, which rarely deteriorates the water that rises from it. The disease alluded to appears to be a kind of leprosy, but, besides this, the inhabitants seem to be more generally affected by gangrene and cancer, than those of any other city through which I have yet travelled in South America. The plains and hill slopes around La Plata are burrowed by ants, which sadly perplex the Spanish Americans, who have not intelligence enough to devise a plan for their extermination.

On the 22d I left La Plata, the way leading round the base of a hill, and then sweeping round to the north-east, descended rapidly to the great valley of the Magdalena. Near the border of the plain is a small village called Peycol, where I remained for the night.

On the 23d I left Peycol, and traversed a wide savana, and then crossed the Paez by canoe, about eight miles below its junction with the river of La Plata. I had now fairly entered on the Magdalena valley, which here presented vast savanas, across which stretched a number of low hills, that run eastward from the Central Cordillera. However, even from the base of the low hills, extends a landscape diversified by irregular masses of black rock, that at a distance looks like a wild sea-shore at ebb tide, and this diversity of character sometimes reaches to the very bank of the Magdalena. After crossing the Paez the way led over an extensive plain, and then, turning a little to the northward, descended over a tract of broken country, ornamented by masses of rock, open green plains, lagoons, and patches of low forest of solanums, and leguminous plants. I saw some curious plants here, among them two species of leguminous trees, one of which was of weeping habit, and perfectly resembled a well-grown specimen of the weeping ash; the other had its bark irregularly blotched over with white patches about four inches square, and, at a distance, the deep green parts of the bark contrasted so strongly with the silvery white patches, as to remind me of the checkered squares of a chess-board. On the edges of the lagoons, I observed a species of *Equisetum*, which, although it grew in a situation where it could not be measured, was apparently not less than 16 feet high, and an inch and a half in diameter at the base. There were besides several species of juncus, and nympheas, and the trees adjacent to the lagoons were well loaded with orchids, such as *oncidiums*, *lælias*, and *odontoglossums*. On the whole I should

* "A small but very pretty village."—*Vigne*, ii. p. 250.—C. R. M.

† "The situation is beautiful, with mountain slopes around."—*Vigne* ii. p. 251.—C. R. M.

should have regarded this place as a kind of paradise, had it not been for the great abundance of tormenting insects, and snakes of an enormous length, which were seen everywhere in great numbers. The different species of insects, especially the various kinds of mosquitoes and ants, formed indeed a series of plagues, that prevented one from enjoying a moment of repose either day or night. It appeared wonderful how the ants, several species of which were of a very formidable nature, and which literally covered the ground as well as the trees, did not entirely consume the surrounding vegetation. When I wished to rest myself, I used to set the dried grass on fire; or if there was none, I made a fire of wood, and spread the hot ashes over the place where I intended to rest; but this plan always made the ground uncomfortably hot, although it was the only mode of keeping the ants and other troublesome insects at bay.

During this day's journey I had at no great distance on the Rio Paez, and on the left a wild black precipitous ridge of barren rocks, from the base of which issued many streamlets of water clear as crystal, a wonderful luxury, certainly, in the valley of the Magdalena. A halt was made as the day closed at the Angostura, a narrow opening in a low ridge of hills on the bank of the Rio Paez, which appears to have been the result of an earthquake, for the hill is rent asunder from top to bottom, and serves as a passage for travellers without encountering the difficulty of ascending or descending the ridge.

On the 24th I proceeded to the bank of the Magdalena, which I crossed by canoe at the Paso del Colegio, which is only about 50 yards below the junction of the Paez with the Magdalena. The Magdalena here was 120 yards broad, and contained a vast body of water, which run with arrowy swiftness. After some delay the march was continued along the eastern bank, over stony plains, scantily covered with herbage, which was completely burnt up by the excessive heat of the weather.

About five in the afternoon I reached the town of Lobo, which contains about 500 inhabitants who gain their living by washing gold dust on the banks of several adjacent streams which fall into the Magdalena. The gold is procurable in small quantities; an industrious washer can collect about one *castellano* (10 s.) in a week, but it is said to be of very superior quality, which is probable, as almost all gold collected on the banks of streams or rivers generally bears a high character.

On the 25th I departed from Lobo, the way leading across a most extensive plain, that runs along the eastern bank of the Magdalena almost all the way to Neyva, undiversified by anything excepting a few clumps of trees in damp places, and the river Neyva. About mid-day the river Neyva was crossed, the bed of which is full of quick-sands that are continually shifting, and thus render it one of the most dangerous passes in the valley.

About 6 p.m. I entered the town of Neyva, which is built on slightly elevated ground on the eastern bank of the Magdalena. It is a town of considerable extent and importance in several branches of commerce, the principal of which are gold dust, tobacco, cocoa, and Chinchona bark. The bark I found here comes from the forests of Lobo and La Union, and is the same as the coarse yellow bark of Pasto. Neyva exhibits the average amount of filth possessed by all South American cities, and besides the animal and vegetable refuse, which is always thrown out on the streets, large herds of swine traverse the principal squares, where they continue to torment from day to day the vendors of vegetables and fruits.

On the 28th I left Neyva, and came to Villa Vieja. The way led along the banks of the Magdalena, over dry stony plains, with a straggling forest of palms and leguminous trees in the damper hollows and on the banks of the rivulets. I reached Villa Vieja about dusk, but there was no herbage to be found for the mules, and so the march was continued until midnight, when on crossing the bed of a river which was dry, I lost the way, and in searching for it fell into a deep sand-hole which had formerly been a whirlpool; but after some exertion I succeeded in getting out, although considerably stunned by the fall. I remained in the bed of the river until the rising of the moon, when the path was discovered, and the march continued over dry stony plains until break of day, when I descended a steep gravel slope to the river of Cabrera. At this place I halted for the day, which was absolutely necessary from the exhausted state

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of the mules, which, owing to the long journey performed in such excessive heat, had suffered most severely.

On the 30th of August I crossed the Cabrera by canoe, and proceeded over dry plains, mostly destitute of vegetation, but covered with large black stones, which reflected the heat of the sun fearfully. This tract would have proved interesting to the geologist, on account of the number of fossil trees that lay scattered about on the road side. In a little hollow, that was not more than an acre in extent, I saw fossils enough to have loaded four or five waggons. Some of the trunks were 30 feet in length, and appeared to be dycotyledonous. About sunset I halted in the plains of Los Angeles.

On the 31st I left Los Angeles, and proceeded over dry hot plains for about four hours, when I entered a palm forest, which continued all the way to the Llanos of Purificacion, where I arrived about the close of the day.

September 1st.—I departed from Purificacion, and after an hour's journey again entered the palm forest, which was apparently of great extent, but there was nothing except palms, for they grew so thickly as to exclude every other plant. Late in the afternoon I crossed the river Prado by canoe, and put up for the night on its northern bank.*

On the morning of the 2nd the march was resumed, the palm forest still continuing, and at four o'clock in the afternoon I crossed the river of Fusagasuya by canoe, when a halt was made beneath the shade of a leguminous tree.

On the 3rd of September the march was continued, and after an hour's journey I emerged from the palm forest and travelled over low gravel hills for about two hours, when the way turned round to the north-east, and led down a steep slope to the river of Tocayma, or, as it is sometimes called, the river of Bogota. This river had also to be crossed by canoe, and then the path led up a steep slope along the edge of a ravine, where I remained for the night.

On the 4th I left Tocayma and ascended a number of steep slopes, which greatly fatigued the mules after such a long journey as they had undergone. About midnight I came to La Mesa, a town built on an elevated table-land of several miles in extent, but hot enough to produce sugar cane and plantains. At this place I halted, as the mules were tired, and could not possibly have proceeded farther without a few days' rest.

On the 14th I left La Mesa and ascended to the Boca de la Montaña. I was now in a cold climate, which strengthened the animals, but there was no herbage to be found anywhere, owing to the excessive dryness of the summer.

On the 16th of September I rose very early, and reached the summit of the ridge before day-break, when I unexpectedly emerged from the forest, and, looking to the eastward, beheld an extensive plain, about 800 feet lower than the crest of the ridge, large portions of which were covered with water; and as the sun arose above the distant ridge of blue hills to the eastward, which forms the western frontier of Venezuela, I descended over a series of dry mounds of sand and earth, on which grew many large specimens of *Cacetae*, to the "Savana," on the eastern side of which is built the city of Bogota. I was nearly half a day in crossing the Savana, and entered Bogota about five in the afternoon.

On the following morning I proceeded to the residence of Mr. Griffith, H. M. Consul-General at Bogota, and inquired whether any communication had been received concerning the collection, and was informed that no notice had been sent regarding it; but that a mail would arrive in a few days, which would probably bring the necessary order for dispatching the seeds. I waited on until the arrival of the mail, but no instructions came, and so I at once began to question the propriety of leaving such a valuable collection in the hands of the Consul-General, especially as he had previously told me that he had not heard anything about it.† From experience obtained during my former travels of matters in this way, I inferred that, as no explicit orders had been received by the Consul, the collection might be thrown aside until the vegetative power of the seeds was gone, or be put in certain places where from damp or other causes they might be destroyed. Besides, I was assured that, even if dispatched, the collection

* "At the river Prado the scenery is pretty, like that of Arcadia, as seen from the coast of the Adriatic."—*Vigne*, ii. p. 256.—C. R. M.

† The instructions arrived at Bogota on the 14th of October.—C. R. M.

collection would not reach England in less than two months. And as no instructions would arrive before 16 days more, on account of the paralyzed state of the native postage between Bogota and the sea-coast, I resolved to return as hastily as possible to Guayaquil, and dispatch the collection from thence to England. With this purpose in view, I left Bogota on the 22nd, and halted at the Boca de la Montaña, where I threw away everything weighty, including articles of clothing, in order to facilitate the march. I cannot at present give a detail of my disastrous return journey, which in itself would fill a bulky volume.

Notwithstanding innumerable obstacles, and the excessive temperature of the valley, I returned to the city of La Plata on the 11th of October. At this place I was informed of the war, which had been going on for about a month, between the republics of Ecuador and New Granada, and that all the passes to the southward were closed to every one. An urgent order had just come from Popayan to the authorities of La Plata for animals, and two of my best mules were forcibly taken from me for this service, by order of the presiding Alcalde. The Alcalde, however, did not send the mules for the order alluded to, but sent two other inferior animals, and retained mine, which were well trained riding mules, for his own special service. I mention this circumstance to show the peculiar sensibility of the Spanish Americans regarding their own interests.

I remained in La Plata until the 25th, when finding my efforts to recover the mules proved fruitless, I travelled on foot with the three remaining animals, which, being exhausted, carried only a few days' provisions, the seed bag, and empty saddles.

On the 28th I came to Inza, where I remained several days, until the bridge across the Paez had been replaced by another equally dangerous. During my stay at Inza, I procured specimens of a comparatively rare tree in New Granada, the Quino Quino, a species of *Myrospermum*.

On November 5th I left Inza, and again crossed the *paramo* of Guanacas, and came to Totoro on the 8th instant. Here I remained until the 15th to give the mules rest, as they had been much fatigued in crossing Guanacas.

On the 16th I entered Popayan, where I remained until the 21st, having previously intended to cross the western Cordillera to Tumaco, but on learning the difficulties likely to be encountered, I resolved to go on to Quito. Before leaving Popayan, I disposed of one mule, which was so much fatigued that it could not be expected to reach Pasto. The rains had just commenced, which rendered the roads almost impassable, but there was no time to be lost, for the Popayan Indians, to the number of 800 men, had received orders to leave for Pasto on the 22nd, where the New Granada army was engaged with the troops of Ecuador. The Indians when on a journey rob everything that comes in their way, therefore I resolved to keep ahead of them, and so left Popayan on the afternoon of the 21st, in company with 11 men, natives of Pasto, who had been in the Cauca valley on commercial business. Provisions were not to be found anywhere, indeed I may say that, almost all the time I was in New Granada, I experienced daily severe pinching of the common necessities of life. At times even dried bullocks' hides were considered a grand luxury. The hide is cut in pieces, and placed on the hot ashes until it becomes nearly black, when this *Carbo animal* is beaten to a powder between two stones, and then put in soup, &c., as a kind of "seasoning." The thickest pieces of the hide are considered the best.

On the afternoon of the second day after leaving Popayan, notice was received from a running post that the Indians were encamped only two leagues behind, which caused us to march quickly on the third day, and we crossed the river of Patia about four in the afternoon. In less than an hour afterwards a fearful tempest of rain fortunately fell over the western slopes of the Cordillera Oriental, which caused the river of Patia to rise some six or eight feet above its ordinary level, and this circumstance prevented the Indians from crossing for eight days.

We proceeded slowly until Mercaderes was reached, where a halt was made about 50 yards from the village, under the shade of two large tamarind trees, which were at the time in full bloom. My companions procured some wood and water, and I was engaged in boiling a little coffee in a tin pot, when a woolly haired negro approached, and ordered us in a tone of authority to remain here or go back, as no travellers of any description were allowed to go to the southward.

ward. I replied that we would conform with the orders, but after dispatching the coffee, each one mounted his mule, and we rode off at a hard trot across the plain, a proceeding which the authorities of the village could not stop, as they had no animals to pursue us. After a four hours' run, each one was again travelling on foot, lest the mules should become tired, and day after day we travelled perseveringly up steep slopes of mud, or over slippery *travesias*, until the 5th of December, when a halt was made on the forest-covered mountains that bound Pasto to the north-east.

Early on the morning of the 6th, the march was continued, and we had begun the descent to the city of Pasto, when a heavy firing commenced near the city, and came up the slope which we were descending. On meeting the retreating party I resolved to diverge from the road, and accordingly struck along a narrow path where the ground was covered with tall shrubs, where I unsaddled my mules and left them to feed near an Indian hut, and picking up the seed bag and a blanket, I ascended a piece of rising ground, when I obtained a good view of the skirmishers. The retreating party numbered about 200, and the pursuers perhaps 150. A halt was made by both parties about 200 yards from where I was seated, and several volleys were exchanged with probably little effect, when the retreating party went off on the road to Popayan, and the others returned to Pasto. Some of the victorious party came to the Indian hut in quest of plunder, and took one of my mules, but the other fortunately escaped, being hidden by tall shrubs. With respect to New Granada, I must say that, although its northern shores are washed by the Atlantic, it is several degrees below the Ecuador in point of civilization. On reaching Pasto, I attempted to recover my lost mule, but was told by the governor that my request could not be complied with until the "question was settled." I removed with my remaining mule to the volcano of Pasto, where I gave it some time to recover its lost strength.

On the 16th of November I left Pasto, and encountered the usual amount of difficulty in passing through the several villages which were occupied by the troops of New Granada. On reaching Tulcan, I went to General Mosquera, and remonstrated with him concerning the loss of my mules, which were taken by the officers of his government. I got a kind of shuffling reply, but he gave me a passport for the generals in command of the army before Ibarra, which enabled me to pass the guards at the different stations without being detained until governors or others should be consulted. At length, after many difficulties, I reached Quito on the 31st of December. At Quito I delivered the bark taken from the suckers of the Chinchona tree in Pitayo, to my friend Dr. Jameson, who proposed to analyze it the first moment of spare time.

On the 1st of January I left Quito, and came to Hambato on the 3rd instant. Owing to excessive fatigue, and the scarcity of animals, for none were to be found anywhere except those employed in the service of the Government, I remained in Hambato until the 14th, and then prepared to cross the northern shoulder of Chimborazo. I slept for the night on the edge of the *paramo*, in a dense fog, and by daybreak on the morning of the 15th I was nearly on the summit of the pass. When I was about to descend the western slopes a heavy storm of hail fell, which pretty nearly put an end to my only remaining mule. At length I came to Guaranda, where a halt was necessary on account of the fearful state of the roads. However with a few days' rest I proceeded slowly, knee deep in mud, and in some places to the waist. After a march of 10 days, I came to a place called Tambobamba, which is only about four hours' journey from the village of Caracol.

Notwithstanding all I had suffered during 10 days of perpetual rain, I was in good health, and resolved to proceed to Caracol, and get on board a small steamer there, which would take me to Guayaquil. The tract of country that lies between Tambobamba and Caracol, consists of low swampy land, covered with lofty canes of *Gynerium saccharoides*, that are interwoven with *Ipomæas* and other climbers. The road was represented by a narrow path two feet wide, and covered with water to a depth of four or five feet. I was told by a negro in Tambobamba that I could not go off the road, which in a certain sense was true, and so, although no guide could be procured, I determined to push onwards and reach Caracol before the arrival of the steamer. Just as I entered the *Gynerium* forest I plunged into a lagoon, which took me up to the waist, therefore I was obliged to prepare for any emergency, by cutting a long pole, with which I

sounded the road as I proceeded. I threw away my coat and boots, which, as they were of no use to me in the circumstances, rather retarded my progress. Thus I went on, carrying the seed bag on my head when wading the deeper lagoons, and carefully proving the bottom with the pole, until about four o'clock in the afternoon, when I suddenly came out of the forest, and saw the village of Caracol only about 100 yards distant. During my aquatic journey through the forest I was nearly devoured by mosquitoes, and the snakes congregated on each side of the narrow path in astonishing numbers. On entering Caracol I was told that no one had come from the interior for 15 days, and many wondered that I was not lost in the forest.

The following day I got on board the steamer, which proceeded directly to Guayaquil. On my arrival there, I at once went to the residence of F. Mocatta, Esq., H B M. Vice-Consul, and requested him to forward the collection to England, which he kindly undertook to do by the first mail, which would leave Guayaquil on the 14th or 15th of February.

I had left some dried specimens of the Pitayo Chinchona, and some very curious ferns, from the "parte peligroso" at Hambato, in order not to cumber myself, and because I had no way of protecting them from the elements.

In September I returned to Guayaquil with the dried specimens, intending to send them on to Mr. C. R. Markham; but on my arrival I found the city in a state of revolution, so that I was obliged to leave the specimens, and return to the interior, without being able to await the arrival of the steamer. If the seeds have not germinated, I will make another collection, and go down the Cauca valley to Carthagena, and dispatch them from thence to England. However, I may mention, that on sowing about a grain of the seeds here, several germinated, so that I have little doubt but that many thousands have been raised from the collection in India.

Reverting to my return journey, it will be observed that the state of the roads increased the difficulties very considerably, besides the fatigue induced by travelling on foot, from the city of La Plata to the plains of Guayaquil, in mud which very often reached to the knee; and fording rivers, which in the summer season are mostly dry, but which, whenever the rains commence, swell into fierce rushing torrents, and very often carry away both travellers and mules. The war going on between New Grenada and Ecuador also formed obstacles, that, combined with the loss of my mules, nearly frustrated the accomplishment of the work.

I was most severely reprimanded by Mr. Markham for not sending the collection from Bogota; but at this time, as at other periods, when employed in collecting seeds, or in travelling in charge of Chinchona plants from equatorial America to India, I executed everything faithfully and to the very best of my judgment and ability. If any error was committed the injury fell on myself, for, owing to the vast tract of country which had to be traversed in a time of revolution, with bad roads, and vicissitudes and hardships of every kind, my expenses amounted to within a mere fraction of twice the sum I stipulated for the work, namely 150 *l*.

Some time ago I received a note from my kind friend Professor Jameson, stating that he had analysed the Pitayo bark brought from the locality from whence the seeds were taken, and that he found it to contain 3.2 per cent. of quinine. I have therefore little doubt that this species, and the *Chinchona officinalis* of Loxa, will prove among the best for cultivation. The climate is like that of Loxa, and even the vegetation of both regions bears a close resemblance to each other.

The Andes of South America—at least so far as I have travelled over them, from the southward of Loxa to the city of Santa Fé de Bogota,—present great diversities of character, and even each particular tract of country possesses its own peculiar and distinctive features. Around Loxa many of the mountain ridges appear as if they had been scraped from top to bottom, and they are separated by profoundly deep ravines, on whose naked and almost perpendicular sides grow only a few stunted cactæ and agaves. To the south-west of the valley of Catamayo, dry rainless deserts extend to the frontier of Peru. However, on passing to the northward of Assuay, the mountainous regions are covered with a dense vegetation, and above the forest limit are extensive grassy *paramos*, while higher still rise rounded elevations, or conical peaks, covered with

with perpetual snow. Beyond Pasto the loftier regions bear an aborescent vegetation; but the hot, low-lying plains are mostly covered with coarse grass, or low-spreading *Leguminosæ*. From this point until one reaches the great valley of the Magdalena, the mountainous region presents a most savage aspect of stupendous precipices, which form a kind of wall along the base of the eastern and central Andes. Throughout this vast territory, but especially along the course of the central Andes, runs a long line of burning mountains, active spouts of hot mineral water and sulphurous vapour, and bubbling mud volcanos.

I have, &c.

(signed) *Robert Cross.*

P.S.—There may be some points concerning the habit and growth of the Chinchona trees in this region, which I have omitted here; but, if so, those in charge of the plantations should write to me respecting anything which may require further explanation. In a second report, part of which is already written, I intend to describe more minutely the Chinchona regions of Loxa and New Granada.

R. C.

Paramo of Ancamarca,
Northern Slopes of Chimborazo,
10 December 1864.

— III. —

CHINCHONA CULTIVATION IN WYNAAD, COORG, ON THE PULNEY HILLS, AND IN TRAVANCORE.

— No. 1. —

CORRESPONDENCE on the subject of Chinchona Cultivation in Wynaad.

From *G. A. Ballard*, Esq., Collector of Malabar, to Secretary, Board of
Revenue.

Sir,

Calicut, 27 June 1864.

THE past season has been one of unusual sickness in Wynaad, and the great sufferings of the people have impressed me very strongly with the urgent necessity of taking all possible steps to alleviate the disastrous effects of future sickly seasons, which in all probability will occasionally recur. I believe the natives have no effective remedy for fever. It is most important to put one within their reach.

2. I do not know that this can be better done than by taking active steps to spread the Chinchona, not only in a few large plantations, but widely in the gardens and small holdings of the people.

3. The generosity of the native agriculturalists can hardly be expected to go to the expense of purchasing Chinchona plants, especially at this early stage, whilst the cultivation is partly experimental; but they undoubtedly are sufficiently alive to the immense importance of raising anything that will tend to ward off or alleviate fever to give attention to the culture of plants distributed to them.

4. I beg, therefore, that a supply of 500 plants in a suitable state of growth may be sanctioned from the Government Chinchona gardens, and that a sum of 150 rupees may be allowed for the cost of baskets, coolie hire, &c. required for distribution.

Can be met from the sum of 1,000 rupees provided for "Other Items" under "I. Land Revenue, Miscellaneous," in the Budget 1864-65.

5. Every care will be taken to distribute the young plants pretty evenly through the talooks, and as far as may be to select persons who will do them justice. Lists will be kept of the recipients, and all endeavours used by the officials to excite and keep up interest in the cultivation.

6. I advocate the gratuitous distribution now purely from a sanitary point of view. But I may add, that from the experiments already made in Wynaad, there seems no reason to doubt the success of Chinchona cultivation there, which may be looked upon as already established in one or two estates.

7. I believe, if what I have proposed is sanctioned, a great benefit will be conferred on Wynaad, and if, as I hope, Government are pleased to allow the plants I beg early orders, so that they may be disseminated during the rains.

ORDER of the Board of Revenue.

1. Ordered to be submitted for the favourable consideration of Government.

2. The case is altogether exceptional.

— No. 2. —

ORDER of the Madras Government, 27 July 1864.

1. IN his letter submitted with the foregoing proceedings, the collector of Malabar, referring to the occasional prevalence of fever in Wynaad, applies for a supply of 500 Chinchona plants for gratuitous distribution among native agriculturalists in that talook, who, that officer observes “can hardly be expected to go to the expense of purchasing the same.”

2. The Government see no reason why Wynaad alone should be thus treated. It is not the only tract in which fever prevails, and is certainly richer than other feverish tracts. The price of Chinchonas, moreover, is extremely small, and when obtained by purchase there is some assurance that endeavours will be made for their being duly cared for; but were the plants distributed gratuitously, as now suggested, it is to be feared that if not neglected they would be destroyed by being stripped of their leaves and bark on occasions of attacks of fever. Mr. Ballard's proposal does not therefore seem expedient, and the Government must decline to accede to it.

— No. 3. —

From *Clements R. Markham*, Esq., to the Secretary to Government, Revenue Department, Fort St. George.

Bangalore, 7 February 1866.

1. WITH reference to para. 40 of my letter to your address, dated 16 January 1866, I beg in continuation to submit my conclusions respecting Chinchona cultivation in Wynaad, after a personal inspection of every part of that district.

2. Along the ridge of western ghauts overlooking Malabar, several grand masses of forest-covered mountain rise from the Wynaad plateau, and terminate in well-defined peaks at elevations of from 4,500 to 5,000 feet. The most remarkable of these mountain knots are the Velerymulla, the Chumbra, the Koocha-mulla, and the Balasore ranges, while the Bramahgherry mountains form the boundary of Northern Wynaad. The sites best adapted for Chinchona cultivation are to be found along the more sheltered slopes of these ranges.

3. The

3. The present state of the undertaking, as regards Wynaad, is not so advanced as I had hoped, and this slow progress is due to the practice of charging money for the plants, a large per-centage of which die on the transit, instead of distributing widely and without stint. Good progress has, however, been made on a few estates, and several planters fully intend to give the cultivation a fair trial.

4. The estates where chinchona plants are now growing are as follows:— There are a few in the Ouchterlony Valley, and on the plantations of the Moyaar Coffee Company. On the Naikenshola estate, in Cherambody, Mr. Minchin has a nursery containing about 50 plants of *C. succirubra*, two or three feet high, as well as several trees planted out, one of which is six feet high and five inches in girth. On two estates, called the Ellembellora and Panora Peaks, on the slopes of the Chumbra Hills, several trees are growing most satisfactorily. The Ellembellora Peak estate, belonging to Mr. Hinde, has an elevation of 3,500 feet, with a western aspect. Seven trees were planted out in February 1864, and they now look very healthy, with leaves untouched by the land wind. They are of the *C. succirubra* and *C. micrantha* species, and average a height of five to six feet, and a girth of five to seven inches. Mr. Hinde expects a cooly load of plants from the Neilgherries in a few days, and he intends to form a plantation on the slopes of the Chumbra mountain, above his estate, at an elevation of about 4,500 feet. The Panora estate is at the northern end of the Chumbra range. Mr. Rossell, the owner, planted out several chinchona trees in December 1863, at an elevation of 3,600 feet above the sea. Not a single drop of rain fell for three months after they were planted, and there are now 12 trees of *C. succirubra* and three of *C. micrantha* planted out, of which three of the former are cuttings struck on the estate. Their height is from five to seven feet, and girth six to seven inches. These two estates, as well as those of Rimington, on the other face of the Chumbra Hills, are admirably adapted for chinchona cultivation, and I look forward to very satisfactory results from the future operations of their owners. On the Anapara estate, at the foot of the Chumbras, Mr. Ferguson has a fine healthy tree. It is worthy of observation that the rainfall on these estates varies exactly as their aspects vary on the slopes of the Chumbra Hills, with reference to the south-west monsoon. The following is a register of the rainfall kept on the two estates where chinchona trees are growing:—

RAINFALL on the Slopes of the Chumbra Hills (Wynaad).

Month.	Panora Peak Estate.			Ellembellora Peak Estate.		
	1863.	1864.	1865.	1863.	1864.	1865.
	<i>Inches.</i>	<i>Inches.</i>	<i>Inches.</i>	<i>Inches.</i>	<i>Inches.</i>	<i>Inches.</i>
January - - -	1.14	0.00	0.00	- -	- -	0.00
February - - -	0.02	0.00	0.00	- -	- -	1.33
March - - -	5.43	0.00	0.72	- -	- -	0.45
April - - -	7.49	7.16	5.08	- -	4.49	7.41
May - - -	5.53	5.30	7.98	- -	8.44	9.37
June - - -	56.66	39.28	22.54	- -	40.49	26.30
July - - -	35.84	54.68	79.60	- -	69.39	97.98
August - - -	36.42	12.67	21.59	- -	16.47	25.78
September - -	7.00	7.77	5.42	- -	10.02	5.41
October - - -	10.43	2.32	4.88	- -	5.90	7.47
November - - -	1.14	1.60	4.77	- -	0.78	4.62
December - - -	1.19	0.45	0.75	- -	0.26	0.76

At Baliapara, on the Koocha-mulla range, there are several plants; and Mr. Richardson has a row planted, in hard gravelly soil, in front of the Cutcherry at Manantoddy. Finally, there are nine very fine healthy plants of *C. succirubra* on the estate of the Bramahgherry Hills, belonging to the Madras Coffee Company.

5. An estate of 300 acres, on the well-wooded hills above the Tirunelly Pagoda, has been applied for by Mr. Lowry, a planter and an excellent gardener, exclusively for chinchona cultivation. Mr. H. Gordon, who is opening

largely on the Bramahgherries and in the Tirunelly valley, has sent for 1,000 plants. Mr. Beaumont, the managing director of the South Indian Coffee Company, intends to form an experimental plantation at the foot of the Velery-mulla range, on the top and round the sides of a hill called Padapara. The plantation will cover about twenty acres, and will be sheltered partially from the south-west monsoon by the Velery-mullas, which tower above it. In short, there now seems to be a prospect of a considerable extension of chinchona cultivation in Wynaad, and, while it will be remunerative to the planters, there will hereafter be supplies of bark for their labourers, growing on the spot. I beg, therefore, to suggest that Mr. Richardson, the deputy collector, be supplied with all reports and proceedings on the subject of chinchona cultivation, and especially with one of the copies of Mr. Howard's work ("Nueva Quinologia de Pavon"), so that there may be the means of reference for cultivators in Wynaad.

6. But, although the extension of this cultivation on the estates of European planters is much to be desired, it is far more important that the natives of the district should be induced to open small chinchona gardens in every direction, and in great numbers. The people suffer fearfully from fever. The scourge has appeared exceptionally early this season, and I have myself witnessed its ravages, while I am assured that later in the year the scenes even on the public roads are loathsome and heartrending. Much of this fearful evil might easily be mitigated.

7. The Chetties, Nairs, and Moplals, who occupy land in Wynaad, generally select elevated knolls for the sites of their dwellings, which are exceedingly picturesque. They are covered with jacks, mangoes, bastard sago palms, and plantains, and overlook the rich paddy cultivation in the flats below. In most of these sites chinchona trees would grow well, and form another item in the garden produce of the people. The healing febrifuge would be at their doors, and the use of the bark would be extended to hundreds of slaves and coolies who now die and rot on the public roads for the want of it. The machinery for carrying out this beneficent measure is at hand. The deputy collector will gladly superintend its details, distribute plants, select the best persons as recipients, explain the importance of the measure, and endeavour to excite an interest in the cultivation. The experiment will cost little or nothing, while the good that may be derived from it is evident. An unspeakable blessing, such as only those who have witnessed the ravages of fever amongst the coolies can fully appreciate, will be conferred on the Wynaad district.

8. I venture, therefore, to recommend this measure most strongly to the favourable consideration of the Governor in Council. In the first instance, about 500 strong young chinchona plants should be supplied to the deputy collector at Manantoddy, and a small sum should be sanctioned for the cost of cooly hire, tools, and the preparation of a nursery. He would then be in a position to propagate and distribute plants, and to take all such measures as, in his judgment, will be most conducive to the great object in view.

I have, &c.
(signed) *Clements R. Markham.*

— No. 4. —

REPORT of an Analysis of Bark of *Chinchona succirubra* grown in Wynaad.
By *J. E. Howard*, Esq.

THE analysis was made of about a quarter of a pound of bark of *C. succirubra* grown in the Naiken-shola estate, at Cherambody, in S. E. Wynaad, by Mr. Minchin. The plant from which it was taken was planted in April 1863, at an elevation of about 3,000 feet above the sea. It was six inches high when planted, and when cut down in December, 1864, it measured 7 feet 3½ inches in girth near the ground.

The analysis gave 5·4 grains of oxalate of quinine, or 1·20 per cent. The crystallizations of the rough oxalate were 2·20 per cent.; but Mr. Howard was not satisfied with this, and by re-crystallization and conversion into sulphate of quinine, subsequently obtained 1·20 per cent. There was besides 0·8 of chinchonidine,

nidine, and 0·2 of chinchonine, making a total yield of 2·20 per cent. of febrifuge alkaloids. There is a loss in such delicate operations on a small scale, and besides the result above stated, there was some uncrystallized quinine which, in large quantities of bark to work, might be made available.

Mr. Howard considered this analysis to be very promising, and that with care, and especially by *mossing*, the Wynaad barks might be made very productive. The analysis showed a bark likely to rival the very best from South America.

— No. 5. —

EXTRACT of a REPORT from *C. Soobiah*, Native Assistant to the Superintendent of Coorg, to the Chief Commissioner of Mysore.

26 January 1866.

THE Government chinchona plantation in Coorg is near Mercara, on the ghaut leading to Fraserpett. The chinchona trees were planted on 24th August 1863, when there were 96 plants, about three inches high.

In August 1864, it was found that seven had died; in January 1866, 19 more had died. The total of deaths was 26. In their room eight had been planted, two on 16th November 1865, and six on 23rd January 1866.

The plants are in pits filled in with ashes and soil, three feet deep. They rooted well in the rainy season, when they were planted, but afterwards suffered from want of moisture in the dry weather. In the dry season of 1865–66, they have been watered every evening, and have derived benefit from the process. For the first six months the plants were protected from the sun by artificial shade.

The plants have put forth primaries, beginning at nine inches from the ground, up to three feet. The girth of the stems is $9\frac{1}{2}$ inches. Four plants have flowered this year. One was 10 feet 3 inches high on 26th January 1866.

NUMBER of Chinchona Plants in the Government Plantation in Coorg on
January 1866.

Planted in August 1863	-	-	-	-	-	-	-	96
Died since	-	-	-	-	-	-	-	26
								70
Replanted	-	-	-	-	-	-	-	8
								78
Remaining in January 1866	-	-	-	-	-	-	-	78

A good many plants have been sold to private persons. There are 75 on the Yemmagoondy estate, belonging to Rev. G. Richter; 70 on the Cuthelay Cadoo estate, belonging to Captain Taylor; and 20 on the Halle-gry-naad estate, belonging to Mr. Mangles. Mr. Richter's and Captain Taylor's are very healthy and promising; but those on the estate of Mr. Mangles are not doing so well, being much exposed to the wind. The plants bought by natives have all died from want of proper treatment.

— No. 6. —

From Mr. *Clements R. Markham* to the Under Secretary of State for India.

Chinchona Cultivation in Travancore and on the Pulney Hills.

Sir,

Neilgherry Hills, 26 December 1865.

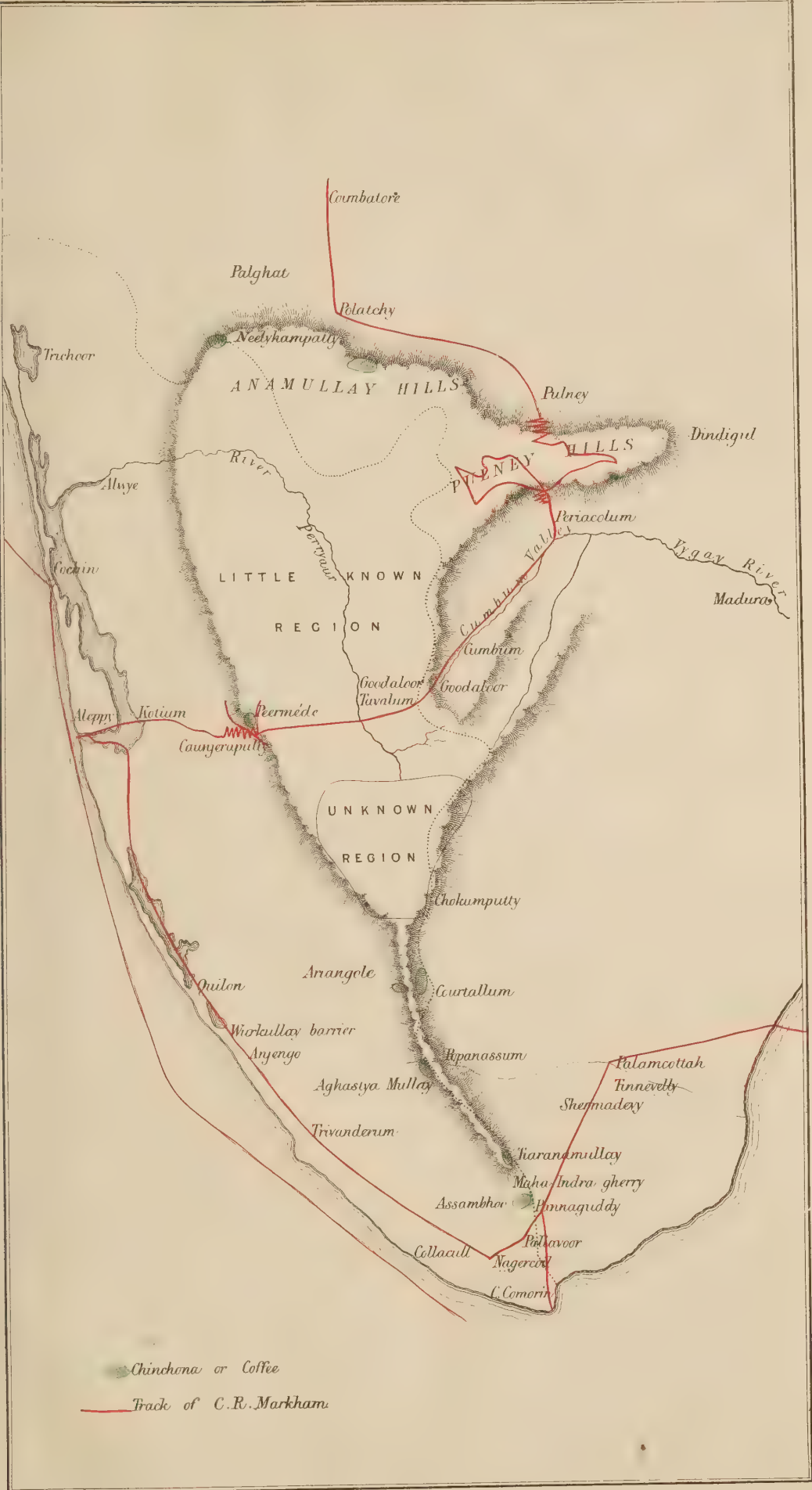
I HAVE the honour to report my proceedings from the date of my letter written at Tuticorin to my arrival on these Hills, during which time I have been engaged in examining porions of the mountain range between Palghat and Cape Comorin, with a view to the selection of sites for chinchona cultivation. The spread of this cultivation throughout the hills of India, by means of numerous

centres of propagation, is, in my view, essential to the success of the principal object for which the experiment was undertaken, and I therefore believe that the results of my recent journeys will prove useful. I shall enter fully on the general question in my report to the Madras Government, a copy of which I shall shortly have the honour of transmitting for the information of the Secretary of State in Council. I now propose to report the particulars of my journeys in the hills of Travancore and of the Madura district.

2. Considerable progress has recently been made in planting on the southern ghauts, and the establishment of coffee and tea estates will always lead to the cultivation of chinchonæ. The natives are fully alive to the importance of introducing the quinine-yielding trees. The Dewan Peshkar of the southern division of Travancore, with whom I had a long conversation at Pannaguddy, asked me for chinchona seeds; and, in subsequent conversations with the Rajah of Travancore, at Trivanderum, and with the Dewan Madava Row, I found that considerable interest was already taken in this measure. Mr. Newill, the Resident, thought it desirable that I should visit Peerméde and the neighbouring hill district, with a view to suggesting the course that should be followed by the Travancore Government with reference to chinchona cultivation; and I considered it to be my duty to accede to his wishes. I had the great advantage of the company of Dr. Cleghorn, the Conservator of Madras Forests, during this expedition. My travelling expenses to Peerméde were defrayed by the Travancore Sirkar.

3. The mountains from Palghat to Cape Comorin may be divided into two distinct regions, for the purposes of description, which are separated from each other by that extensive unknown tract of country, where the sources of the great river Perryaur are still concealed from our knowledge. The southern region extends from Cape Comorin to Courtallum, and comprises the mountain chain which divides Travancore from Tinnevely. Near Cape Comorin, isolated masses of weather-beaten rock rise abruptly from the plain, and form an outline of battlements and pinnacles against the sky; and the continuous range only commences north of the Aramboly Pass, where the mountains attain a height of 3,000 feet and upwards. The range is not broad, and has little or no intermediate table land, but slopes abruptly from the summit ridge to the rich green expanse of Travancore on one side, and to the dried-up plain of Tinnevely on the other. The peaks rise to a height of 6,000 feet. Several coffee estates have already been formed on these hills. The most southern are at Assambhoo, at an elevation of 3,000 feet, immediately above the Aramboly Pass. General Cullen, who was Resident from 1840 to 1860, originally formed a coffee garden at Assambhoo, which is now owned, in partnership, by the first Prince of Travancore and the Dewan. But, within the last few years, the Rev. J. Cox, a missionary, a Mr. Gordon, and two planters from Ceylon (Messrs. J. and J. C. Grant) have opened coffee estates at Assambhoo, with every prospect of success. The principal drawback to this site is its exposure to severe gales of wind, which do much injury to the plants. Further north, and on the Tinnevely side, at the feet of those grand precipices called Maha-Indra-gherry and Tiranamullay, there is a small coffee estate, owned by a wealthy and liberal-minded Mohammedan, named Meer Anjemir, who lives at Pannaguddy. At the foot of the peak of the Aghastya-mullay, in Travancore, a fine tract of forest land has been purchased, but not yet cleared, by General Sim. On the Tinnevely side, in the forests near Popanassum, 500 acres have been granted to Mr. Barter, of Tuticorin. This estate, which has not yet been surveyed, is on the Vellar river, and 50 yards of jungle are to be reserved on each side of the stream. Messrs. Cocq, of Tuticorin, have long had coffee estates near Courtallum, which are now managed by Mr. Crabbe; and Messrs. Binny, of Madras, have tea, cacao, and spice gardens, under the management of Mr. Liddell, of Quilon, in the Arriangole Pass, at an elevation of only 1,200 feet above the sea. There are other clearings of minor importance.

4. There is a notable difference between the climate on either side of these ghauts. On the west side the slopes are abundantly watered by the south-west monsoon, and the streams fall into the backwater, supplying the narrow slip of land with water in abundance. On these Travancore hills clearing may be carried on to any extent, without detriment to the low country, which could well dispense with some of its surplus moisture. But, on the east side, the due supply of water for the tanks and channels is a necessary of life to the



the people inhabiting the wide plains of Tinnevely. Indiscriminate felling on these eastern slopes would lead to most deplorable results, and the evil is already beginning to be felt. Further grants of land have been prohibited in the Tenkassy Taluq, and in Nanganary the people complain bitterly of the drying up of the streams. There can be no doubt that serious consequences will arise from indiscriminate felling; but, when 1,84,000 rupees are required for the repair of tanks and channels in Tinnevely, and only 48,000 rupees are granted, the failure of water cannot be entirely due to a reduction in the rainfall caused by clearing on the hills.

5. Chinchona plants, on a more or less efficient scale, will be hereafter cultivated on all the coffee clearings and other lands that I have enumerated, and it should be remembered that their beautiful foliage will be even more effectual in wringing moisture out of the passing clouds than the original jungle. The natives are well acquainted with the value of quinine; and when the trees which yield it are growing round the base of that magnificent peak, 6,000 feet above the sea, that is dedicated to their great Rishi and physician, Aghastya, they will fully appreciate the blessing that has thus been brought to their doors. Severe gales of wind cause the chief difficulty in commencing cultivation on these mountains, especially on the exposed slopes of the Aghastya-mullay, but the chinchona trees, when they once get through the first two or three years of their growth, will not suffer irreparable damage from this cause.

6. I now come to the northern division of the mountainous region extending from Palghat to Cape Comorin. It includes the Anamallay and Pulney hills, in British territory, and an extensive hill district within the native states of Cochin and Travancore, and differs from the southern division in possessing several ridges with wide stretches of table land, instead of a single line of mountains sloping directly from their summits to the plains on either side. The Travancore portion of this region is by far the most extensive, but until quite lately no attempt had been made to open cultivation on it, and the southern part is still entirely unknown. Mr. Maltby, in 1862, formed a small garden at Peerméde, on the western verge of the Travancore mountains, and several coffee planters have since settled in its neighbourhood. Their pioneer was Mr. Munro, and he it was who made the road to the foot of the ghaut for the Travancore Sirkar. The road commences at Kotuim, on the Cochin backwater, and passes over undulating country, covered with forest, to the foot of the mountains at Mundakayum, a distance of 33 miles. For this distance a good bandy road has been completed and bridged throughout. At Mundahayum there is a large river, Kullapoliem, where a good stone bridge is in progress, and here the ascent of a ghaut commences, which is quite equal in beauty to that of Sispara. The road up the ghaut is not completed, and extensive blasting operations were necessary, but large gangs of coolies were at work, and rapid progress was being made. The coolies were getting four annas a day (an ordinary labourer's pay in the plains being two annas), and for boring rock they are paid by the foot. They get four annas a foot, and can do three feet a day, but are not paid unless their labour results in a good blast.

7. At the top of the forest-covered mountains is the region called Peerméde, a country of grassy slopes, splendid forest land, rocky ridges, and lofty peaks, averaging an elevation of 3,000 feet above the sea. At its western edge, whence there is a glorious view of the 30 miles of forest as far as the backwaters and the sea, Mr. Maltby, who was then Resident of Travancore and Cochin, built a house, which he called Maryville, and established a chinchona garden for the Travancore Government. This was in 1862.

8. The rajah granted 1,000 rupees for a garden and a glass house, 300 rupees for getting chinchona plants from the Neilgherries, and 40 rupees a month for a gardener and coolies; and, in December 1861, Mr. Maltby wrote a most interesting memorandum on the subject: "The garden," he then said, "may be viewed as formed to aid in the introduction into the mountainous country of Travancore of the chinchona plant, and its other objects may be considered as subordinate to this, such as the growth of tea, coffee, &c. The question is, how the Travancore Government can most successfully second the efforts of the British Government, and make due use of its mountain region in extending chinchona cultivation. There are mountains near Maryville on which subsidiary plantations may be formed up to nearly 6,000 feet. Extensive seed beds should be formed, and there should be about 10 acres of

coffee. By selling the seedlings to planters, at a yield of half a ton an acre, the profit would probably cover the cost of the garden. Tea should be raised in the same way, and the towns on the coast might be supplied with potatoes and onions. The Maryville garden was commenced by planting apples, pears, grapes, oranges, strawberries, raspberries, roses, geraniums, fuchsias, &c., and kitchen vegetables."

9. On 11th December 1861 the four first chinchona trees were planted by Mr. Maltby at Maryville; a *C. Peruviana* in the north-east corner, a *C. succirubra* in the south-east, a *C. nitida* in the south-west, and a *C. micrantha* in the north-west. But his admirable suggestions have been very inefficiently followed out since ill-health unfortunately obliged him to retire in 1862. Mr. Newill, the present Resident, furnished us with the following memorandum, dated December 1865: "The Government garden at Peermède was established about three years ago. In March 1863 about 500 chinchona plants were brought from Ootacamund by Mr. Hannay, the superintendent of the Sirkar garden. They were then about two months old, and from one to two inches high. Many died when quite young, from the effects of damp, drought, or cutting winds. There are now about 220 strong and healthy plants, and some 200 young plants have been propagated. The *C. officinalis* has a tendency to throw out branches along the ground, like a creeper. The tea plants are now three or four feet high, and seeding freely.

"So far the experiment has been encouraging, and it seems desirable for the Sirkar to pursue it, so far as to provide the means for planters to try it on a more extensive scale, though I question the expediency of the Sirkar entering into extended operations, which may be left to the enterprise of others.

CHINCHONA PLANTS, at Peermède, December 1865.

	Name of Species.	Number.	Average Height.		Height of Tallest.	
			Ft.	In.	Ft.	In.
Age 2 years and 10 months.	<i>C. succirubra</i> - -	79	5	0	8	6
	<i>C. micrantha</i> - -	46	3	6	6	0
	<i>C. Peruviana</i> - -	27	3	0	6	0
	<i>C. nitida</i> - - -	13	2	6	3	0
	<i>C. officinalis</i> - -	60	2	6	4	7
	TOTAL - - -	225				

10. I found the plants at Maryville looking vigorous and healthy, although the leaves and some of the branches had suffered severely from the cutting land winds of the north-east monsoon. The site is not, I think, the best that could have been chosen. It is exposed to the whole force of the land wind, as well as to the south-west monsoon, yet the plants may be successfully propagated here, and, if the plantation is extended, there is a well-sheltered sholah to the south-east. The elevation above the sea is 3,300 feet, and the temperature is suitable. The rainfall, according to observations made for General Cullen, varies from 125 inches on the western skirts to 40 inches on the eastern crests of the ghauts. The girth, close to the ground, of the largest *C. succirubra* tree was 9 inches. There were 225 chinchona plants, exclusive of cuttings, 5,000 coffee and 4,000 tea seedlings. With regard to the establishment, I found that Mr. Hannay, the superintendent, received 120 rupees a month, a blacksmith 15 rupees, a carpenter 14 rupees, a maistry 12 rupees, and 11 coolies 7 rupees each; making 238 rupees a month, or about 285 l. a year. There is no regular allowance for the garden, and no glass house has yet been completed.

11. We have reported our impression, and submitted various recommendations respecting this garden, and generally on chinchona cultivation in these hills, to Mr. Newill, for the consideration of the Travancore Government. The Maryville garden should be the source of supply whence chinchona plants should be forwarded to every part of the Travancore hills, as opportunities for the cultivation may arise. With this view the expenditure might well be raised to 500 l. a year; a gardener might be procured, trees might be cultivated for seeds, and propagation might be extensively carried on; and the garden should be

be self-supporting, through the sale of coffee and tea seedlings, and of kitchen vegetables. The cultivation of *C. officinalis* should be given up, the elevation being insufficient, and attention should be turned entirely to the spread of *C. succirubra*, *Calisya*, and *micrantha*. This measure, originated by Mr. Maltby will, if properly and systematically carried out, be a great blessing to the people, and highly creditable to the Travancore Government.

12. The coffee estates, the first of which was only commenced in 1862, are from a mile to four miles north-east of the Maryville garden, and are rapidly taking the place of the beautiful natural sholahs. They are at present six in number, and the extent of country taken up, cleared, and planted, will be seen at a glance in the following Table :

COFFEE ESTATES, &c., at Peerméde, on the Travancore Ghauts.

Name of Estate.	Owners.	Managers.	Acres.			Remarks.
			Grant.	Cleared.	Planted.	
1. Maryville - -	Travancore Government -	Mr. Hannay -	-	-	-	Chinchona plantation.
2. Hope - - -	Originally owned by Mr. Monro, now by a company.	Mr. G. Baker -	500	300	150	Commenced in 1862. The felling has been too extensive, and sufficient attention has not been paid to weeding.
3. Woodlands and Keppoch.	Originally owned by General Stevenson, now by four partners : 1. General Stevenson. 2. Mr. Crawford, commercial agent at Aleppy. 3. M. Aspinall, of Cochin. 4. Mr. Oughterson.	Mr. Oughterson Mr. Stevenson, assistant.	500	140	110	Commenced in 1862.
4. Ashley - - -	Dr. Petman - - -	Dr. Petman -	200	100	60	Commenced in 1863.
5. Stagbrook - -	Mr. Robert Baker - -	Mr. R. Baker -	200	30	30	Commenced in 1863.
6. Fairfield - -	Mr. Henry Clarke - - Dr. R. Clarke.	Mr. Henry Clarke	900	15	-	Mr. Clarke has only recently commenced felling.
7. Twyford - - -	Mr. Richardson - - Rev. H. Baker, missionary.	Mr. Richardson -	600	40	40	Commenced in 1864.
8. Wullungum-canum sholah, containing 1,400 acres.	Mr. Crawford, commercial agent at Aleppy.	- - -	500	-	-	Felling not yet commenced.
9. Messrs. Pierce, Leslie & Co., of Cochin, and a Mr. Berry.	- - -	- - -	-	-	-	A grant of about two square miles.

13. All the country occupied by these coffee planters is well adapted for Chinchona cultivation, and I was glad to find that they were inclined to undertake it. The tract fitted for coffee extends from the crest of the ghauts to a range of hills about three or four miles further to the eastward, and for many miles to the north and south. The country is intersected by well-wooded ranges of hills, occasionally running up into fine peaks, such as Amarithamullay, overlooking the low country, which is 4,700 feet above the sea; the Anaconum Peak, overhanging the Woodlands estate; and several others not marked on the trigonometrical survey, but which will be found on the accompanying map. The scenery is exceedingly beautiful. The undulating hills are covered with tufts of lemon and elephant grass (*Andropogon*), growing to a height of six or eight feet, and the valleys and mountain sides are clothed with fine sholahs. Unlike the comparatively stunted stems and umbrella-like foliage of the Neilgherry and Pulney hills, the trees in the Peerméde sholahs, at a lower elevation, grow to a great height, and present a grand appearance. The undergrowth beneath them consists of cardamom, wild ginger, zedoary, rattan, a small bamboo, called eetah by the natives, and a few ferns. The following are the principal trees: the Parl-murum (*Isonandra acuminata*), a large tree only recently discovered by General Cullen, much used for planking; the Nanga,

called by the planters "iron wood," appears to be a sort of poon; *Anjolie* (*Artocarpus hirsutus*), yielding a very valuable timber; *Aranili*, a tree of the jack tribe, from the bark of which bags are made; *Terminalia catappa*, or Indian almond; *Erythrina Indica*, at the edges of the sholahs; wild cinnamon; two species of *Eugenia*, and some other *Myrtacæ*; two kinds of *Garcinia* or gamboge trees; and the *Canarum strictum*, or black dammer tree, called by the natives *Congilium-marum*. Besides the eugenias, there are several other beautiful flowering shrubs outside the sholahs, but still under the shade of their trees, such as *osbeckia*, *crotalaria*, and the brilliant dark blue *torenia*, so common on the *Sispara ghaut*. These fine sholahs, with their valuable timber, are fast disappearing under the axe of the planters, and the loud crash of falling trees is constantly heard on the hill sides. The sites best adapted for chinchona planting are the forest slopes beneath the peaks called the *Tumbys*, and within Mr. Clarke's estate. They are well sheltered from the cutting land winds, and partially so from the south-west monsoon, while the numerous mountain streams supply abundance of water. It is, I am happy to say, the intention both of Mr. Clarke and Mr. Oughterson to undertake chinchona cultivation.

14. A telegram from Mr. Levinge, the collector of Madura, induced us to undertake an expedition from Peerméde across the mountains, by a very unfrequented route, to the Madura district. I considered it desirable to take this line, both because it would enable me to judge of the country across the whole width of the Travancore ghauts, and because I should thus have an opportunity of consulting Mr. Levinge on the important subject of chinchona cultivation on the Pulneys.

15. A reference to the map (Sheet No. 62), will show that there is a very extensive mountain region between the plains of Travancore and those of Madura. The southern portion, extending over an area of about 30 miles by 20, out of which issues the river Perryaur, is entirely unknown, and is a blank on the map. The northern part borders on the Anamallays, and is almost as little known. The great river Perryaur, flowing from south to north, traverses the centre of this mountain region, and, after a long course, eventually turns to the west, and falls into the Cochin backwater. Our route passed right over this country, crossing the Perryaur. The mountains are owned, under the Travancore Government, by the petty Rajah of Pooniat, and from time immemorial there has been a track called the Pooniat road, traversing Peerméde and passing down into the Cumbum Valley on the Madura side. It was used by the elephant hunters, whose old pits are still to be seen, and by the Pooniat rajahs' cardamom gatherers. The ancient Pandyon kings of Madura are said to have received their supplies of betel, pepper, and cardamoms by this route, in exchange for rice and cloth. At present the Madura people annually drive their herds up to these mountains for pasturage, but the only inhabitants are a wild tribe of wandering hill people called Uralas. They are seldom seen.

16. The distance from Peerméde to the Perryaur river is $7\frac{1}{2}$ miles on the map, 10 miles by our route; from the Perryaur to the eastern crest of the ghauts, $5\frac{1}{2}$ miles on the map, 8 by our route; from the crest of the ghauts to Goodaloor, on the Madura side, 8 miles on the map, 12 miles by our route. A total distance of 30 miles on foot, over a most difficult country.

17. The road leads from Peerméde across grassy uplands, with much rock on the surface, to the river Urraday, whose affluents water the Hope and Woodlands estates, and crosses the stream at the Urraday Tavalum. These tavalums frequently occur on the map. They are merely places where herdsmen are in the habit of resting their bullocks, and are known by several acres being overgrown by a species of composita (*Blumea*), the result of bullock manure. The land must be very rich and valuable. There are several magnificent sholahs on the hills overhanging the Urraday, and facing to the westward; but after crossing them, the country to the eastward presents a hotter and drier appearance, the sholahs are smaller, there are large patches of eeta bamboo in them, indicative of a poor soil, and they often only extend a few yards on either side of the streams. We saw several bison on high hills to the south, sambar bounded before us into the sholahs, and there were numerous traces of elephants and cheetahs. The country appears never to have been entered by a shikar. We passed through the Pambanur (snake) tavalum, and over hills covered with grass 10 and 12 feet high, a most blinding and tedious march, and finally came, by a steep descent, through bamboo jungle, to the banks of the Perryaur.

18. Although

18. Although this was nearly the lowest season, the river was 30 yards across, and we found by the marks that, during the monsoon, it rises eight feet higher. The whole of this immense volume of water now runs to waste in the Cochin backwater. But there has long been a project to throw a dam across, at a point 13 miles south of where we crossed, and to make a cutting, so as to throw the river over into the Madura district. The details of this project and its former history are so interesting, and of such great importance, that I have embodied them in a separate memorandum, which I herewith enclose. It will probably be useful, as the subject must, sooner or later, be brought before the Secretary of State in Council.

19. The coffee plantations have already begun to attract traffic over this formerly unfrequented route; and before long, a good bullock track, and a bridge over the Perryaur, will become an urgent requirement of the district. The rice and cloths of Madura will be exchanged for the silver of the planters and the betel, cardamoms, and tobacco of Travancore. We found 200 bullocks on the banks of the Perryaur, laden with rice for the coffee plantations, coming from the Cumbum valley. The bullocks were driven in, and made to swim across, while the bags of rice were ferried across on a rude bamboo raft; a process which seemed likely to occupy at least 24 hours. One only has to be a witness of proceedings such as this, to be deeply impressed with the delay and injury caused by the absence of bridges. We crossed the river on the same bamboo raft, but the coolies with our tent did not arrive until late, having been driven or rather frightened off the road by a herd of wild elephants. The river is here lined on both sides with clumps of bamboo; the bed is very rocky, and the water clear and cool. As night closed in, the fires of the herdsmen and the mass of white bullocks under the bamboos were finely reflected in the river. Fires throughout the night were necessary, to keep off the tigers which abound in extraordinary numbers, denoting the great abundance of other kinds of game.

20. After passing up the bamboo jungle which fringes the river on the east side, we entered upon a country presenting a still more dried-up appearance, though the grass was still of immense height. Stunted trees were scattered over the open hills, chiefly *Terminalia coriacea*, and here we met with the first teak trees. The land is formed into a large amphitheatre of hills, with two sharp peaks, and after descending the slopes, we entered a thick bamboo jungle, and had to wade along the bed of a torrent up to our knees for a considerable distance. The woods abound in black monkeys with white beards, jungle fowl, and imperial pigeons. The Goodaloor tavalum is an open space in the midst of the forest, about $5\frac{1}{2}$ miles from the Perryaur, and close to the crest of the eastern side of the ghauts. The descent into the Cumbum valley is rapid and precipitous, over huge boulders of rock, and often crossing a mountain torrent. The ghaut is clothed with splendid forest trees. Black wood (*Dalbergia latifolia*), one of which I measured 4 feet from the ground, and found to be 17 feet in girth, and another was at least of equal size; vengay trees (*Pterocarpus marsupium*), yielding excellent wood for building purposes, as well as the gum, kino of commerce; a tree called locally vekali (*Conocarpus latifolius*), the wood of which is also used for building; the black dammer tree; and lower down, great quantities of the loathsome *Sterculia foetida*, which yields an inferior kind of poon spar. Here and there we got peeps of the rich Cumbum valley as we descended, with mountains on the opposite side. On first coming out into the valley, there is a wide stretch of open grass land dotted with the yerkum bush (*Calotropis gigantea*), where immense herds of cattle were feeding, and further on there are fields of castor oil, and fine crops of toor and raggee. The shade in the upper part of the valley is afforded by the umbrella thorn (*Acacia platifrons*), the *Euphorbia pentagona*, growing like a tree, and the Palestine thorn (*Parkinsonia aculeata*). Lower down the valley, the road is shaded by banyans and tamarinds. I have described the irrigation of the Cumbum valley, and touched upon the subject of making a road thence to Peerméde in the accompanying memorandum on the Perryaur; and I need only add here that, on reaching Periacolum, where the cholera was raging, we went up to the Pulney hills without delay, by the Periacolum ghaut.

21. My examination of this route convinced me that the country eastward of Peerméde was unsuited for chinchona cultivation, although I think it probable that, if the dense forests round the sources and upper course of the Perryaur are ever partially cleared, good sites will be found for the growth of the red and grey barks.

22. Mr. Levinge obtained 12 chinchona plants from Ootacamund in March 1864, and they were planted in his garden at Kodakarnal on the Pulneys, in the following April; they were then two or three inches high. The site is well sheltered, with a north-west aspect, and the land was originally not sholah, but common grass land; about two feet of mould, below which there is large-stoned gravel, and below that, red clay. Holes were dug well through the gravel, and the earth was mixed with a little manure, in which the trees were planted, nine feet apart each way. The site is 6,985 feet above the sea. On 18th December 1865, the state and condition of these trees was as follows:—

CHINCHONA TREES at Kodakarnal, on the Pulney Hills, December 1865.

Species.		Height.		Girth of Stem.	REMARKS.
		<i>Ft.</i>	<i>in.</i>	<i>Inches.</i>	
<i>C. succirubra</i> , No. 1	-	4	9	7	The largest leaf was 11×7 inches.
" "	2	4	9	6	
" "	3	5	2	4½	Three large shoots rising from the stem.
" "	4	3	10	5½	
" "	5	-	-	-	Numerous shoots springing from the stem.
" "	6	1	9	-	Sickly.
<i>C. officinalis</i> , No. 1	-	4	8	5½	Shoots on the stem. Tree covered with buds.
" "	2	5	0	5	Covered with buds and flowers. Many shoots on the stem.
" "	3	4	5	4¾	Fine healthy tree.
<i>C. micrantha</i> , No. 1	-	4	1	6½	Stem divided into two near the ground.
" "	2	-	-	-	Sickly. Broken down by an accident.
" "	3	3	3	4¾	Sickly. Died down, and shot up again.

23. I have already described the Pulney hills, and have recorded my opinion as to their capacity for chinchona cultivation, both in my former Report and more fully in my work. My present visit has not induced me to alter the views which I then formed. As the trees of *C. micrantha* were drooping, I recommended that they should be transplanted to the Kodakarnal sholah, near a stream where tree ferns flourish. I have also supplied Mr. Levinge with a parcel of seeds of the *C. officinalis*, procured from Ceylon. This species will, no doubt, thrive well on the Upper Pulneys, as will also *C. Pitayensis*, the seeds of which have just arrived at Ootacamund. *C. succirubra* should be introduced into the Lower Pulneys, where, however, very little progress has been made in coffee planting. The climate is too dry, and there is much fever. Mr. Spershneider, formerly in the Forest Department, has about 40 acres of coffee on the Lower Pulneys, at a place called Pali-mullay. M. Fontclerc, a Frenchman, has a small coffee garden, and a short time ago Mr. Coyle, a missionary, had another. The native villages are generally on round knolls, with fine jack and mango trees, surrounded by terraced cultivation, garlic, onions, potatoes, vendiam (fenugreek), and some coffee. They are exceedingly picturesque, but are well within the fever zone, and every house should have a few trees of the healing chinchona near it. The difficulty is to find machinery for the spread of the cultivation. A collector, who takes an interest in the work, can do much; an intelligent subordinate in the Forest Department still more. On the Pulneys we now have a good beginning, and every prospect of satisfactory progress. There are the means of propagating, to any extent, in Mr. Levinge's nursery, and suitable sites for cultivation abound. I rode over a portion of the higher Pulneys, where there are several sholahs of considerable extent, with northern aspects, at an elevation of 6,000 feet, which are well protected from the strong winds of both monsoons, while they receive all the moisture that reaches the hills. We selected one, as the best of all, in the direction of Manavanoor, which covers about 150 acres. I have since written fully to Mr. Levinge on the whole subject.

subject. On leaving the Pulneys we passed by the villages of Vilputhy and Pullanky, crossed the heights of Talla-mulla, and down a precipitous and rocky pass on foot, to the village of Pulney.

24. It only remains to say a few words respecting the Anamallays, which I regret to say I could not spare time to visit, though I enjoyed a grand view of them from Polatchy. Here there is an unlimited area for future planting; every species of chinchona will flourish at the different altitudes, from 7,000 to 3,000 feet, and in few places will the blessing of the presence be more felt than in the neighbouring districts. The native hospital at Polatchy, within 10 miles of the Anamallays, the beneficial effects of which already extend to all the fever districts at the foot of the hills, will hereafter receive unlimited supplies of bark, and have the febrifuge manufactured on the spot. All this is in the future, yet a commencement has already been made in planting the Anamallays. Mr. Macdonald Ritchie, and his agent and partner, Mr. Lowrie, have opened a plantation on a very large scale, in the Ponachy valley, their grant including several thousand acres; and besides proceeding rapidly with the clearing, Mr. Lowrie is making a road up the ghaut at his own expense. A Mr. Nisbett and a Mr. Lees, agent to the Carnatic Coffee Company, with whom I understand that Messrs. Arbuthnot, of Madras, are connected, are also opening estates on the Anamallays, and a wealthy native, named Rama Swamy Modeliar, who owns extensive property at the foot of the hills, has long had coffee gardens higher up the Toracudda valley. At Nelliampatty, in Cochin, about 20 miles south-west of Palghat, there are also five coffee estates. I have now passed in review the whole of the clearings from Cape Comorin to Palghat, and I have no doubt that, though primarily made for coffee or tea cultivation, they will all necessarily lead to the extension of chinchona cultivation, and thus in furthering the beneficent intention of the febrifuge plants, prove a permanent blessing to Southern India.

25. From Pulney and Polatchy I have made the best of my way to the Neilgherry hills, where I have since been incessantly engaged in inspecting the plantations, and in considering the important questions which now arise in connection with chinchona cultivation. When I submit the results of my investigations to the Madras Government, I shall at the same time transmit a copy to your address, for the information of the Secretary of State in Council, in which the practical conclusions at which I have arrived during my recent journeys above reported, will appear.

26. I have the honour to submit the following enclosures:—

1. An additional Memorandum on the subject of immigration to Ceylon.
2. A Memorandum on Madura irrigation and the Perryaur project.
3. A Memorandum on public works connected with the Travancore backwaters.

P. S.—I have materials for a map of the Perryaur region, with many new names of peaks and rivers, fixed by cross bearings, and two observations, at Peerméde and Cumbum, for true bearing; and also for a plan of the Wurkullay barrier; but I regret that I have not yet had time to put them on paper, so as to transmit them with the enclosures.

— No. 7. —

From Dr. *Cleghorn*, the Conservator of Forests, to the Secretary to Government, Revenue Department, Fort St. George.

Madras, 6 February 1866.

1. I BEG to submit, for the information of his Excellency in Council, copy of a Memorandum on the Government garden at Peermade, Travancore, which was drawn up at the request of Mr. Newill, the resident.

2. Mr. Newill informs me that his Highness the Rajah has approved of the recommendations generally, and steps are being taken to secure the services of a skilled superintendent from Europe.

MEMORANDUM on the Government Garden at Peermade.

1. The proposal to establish a Government garden upon the Travancore Ghâts, for the introduction generally into that mountainous tract of useful and ornamental plants, as tea, coffee, vanilla, &c., but more especially for the naturalization of the chinchona tree, originated with Mr. F. N. Maltby, the late Resident, and was in every respect an admirable one.

2. Mr. Maltby, in his Memorandum dated 23d December 1861, considered that Peermade, or rather the new station called "Mary Ville," on the proposed line of road from Alleppey to Madura, and 47 miles distant from Kotiam, afforded suitable advantages. It is healthy, open to the sea breeze, with an elevation of 3,300 feet above the sea, and enjoys a temperate climate; the adjoining district presents a remarkable variety of soil and scenery. Between it and the Perryár River, is an undulating plateau, where forests alternate with grass lands, affording fine pasture for cattle.

3. Near Peermade, on the same range of mountains, appropriate sites may be found, up to an elevation of near 6,000 feet, where subsidiary plantations might be formed to suit the different species of chinchona.

4. The rain-fall, according to the observations of General Cullen, who kept a register for a long series of years, varies from 40 inches on the eastern ghâts to 125 inches in the western slopes, diminishing towards Cape Comorin; while the thermometric register of Mr. Maltby at Peermade in December 1861, shows that the mercury fell to 58° Fah. in the early morning, and rose to 74° Fah. at 2 P.M. in the shade. Farther observations with maximum and minimum thermometers would be very valuable.

5. To carry out Mr. Maltby's project, his Highness the Rajah of Travancore sanctioned the following sums:—

1,000 rupees for the garden and glass house.

300 „ for plants and seeds from the Neilgherries.

40 „ monthly for gardeners and coolies, with the promise of a suitable grant for seeds and plants as required. These sums were applied to the preliminary works in 1862. In March 1863, about 500 chinchona plants, two months old, and from one to two inches high, were brought from Ootacamund by Mr. Hannay, the superintendent of the garden, but more than half were lost, some in transit, and others soon after arrival from the effects of exposure to drought, damp or cutting winds, as the glass house was not ready for their reception.

6. I visited Peermade, in company with Mr. Markham, in December 1865, and remained two days. Although Mr. Maltby's scheme has not been followed out in detail, it is satisfactory to record that the Travancore Sircar has well seconded the efforts of the British Government, and that the result of the chinchona experiment is more successful here than anywhere else in Southern India, excepting on the Neilgherries. The accompanying Table gives the age and height of the plants at the date of our visit.

PEERMADE Chinchona Nursery, December 1865.

Names of Plants.		Number.	Height.	Age.	Height of Tallest Tree.
			<i>Ft. in.</i>	<i>Yrs. m.</i>	<i>Ft. in.</i>
Chinchona	succirubra	- 79	5 0	2 10	8 6
"	mierantha	- 45	3 6	2 10	6 0
"	Peruviana	- 27	3 0	2 10	6 0
"	nitida	- 7	2 6	2 10	3 0
"	officinalis	- 60	2 6	2 10	4 7
"	Unknown	- 6	- -	2 10	3 6
		225			

About 200 were also raised from layers and cuttings.

7. The girth of several of the largest of the *C. succirubra* was nine inches close to the ground, and their height for their age was generally satisfactory; some

some of the plants had been broken by the violence of the wind, but were in a healthy state, throwing out strong shoots from the seat of injury. The chinchonas planted in the shola behind the Sircar bungalow had suffered comparatively little from the wind.*

8. The species that thrive best are *C. succirubra* and *C. micrantha*, but *C. Calisaya* should be tried. The *C. Condaminea* (or *officinalis*) is evidently planted at too low an elevation, being weak and delicate, with a tendency to throw out branches along the ground.

9. The Peermade garden has a southern exposure, and receives the full burst of the south-west monsoon, from the violence of which all the plants above the size of dwarf shrubs have suffered in some degree; but as the Government have in view the dissemination of seeds and seedlings rather than the formation of a large plantation, it does not seem advisable to change the site, particularly as a glass house and superintendent's cottage have been already built; the present nursery, however, might be sheltered by planting screens of Australian acacias,† or other quick growing trees, and the garden might be extended in the shola behind, which is sheltered from the prevailing winds.

10. The experiment of chinchona introduction having been thus far successful, it is now desirable that the Travancore Sircar should furnish the means of extended culture to the planters of this rising settlement, and to the neighbouring ranges of hills, as opportunities may arise; I therefore beg to suggest that 12 grown plants of *C. succirubra* be at once given to each of the planters, who are ready and desirous of commencing chinchona culture; and thereafter as many young plants of this and other species as may be available, to applicants at the old Neilgherry rate, viz., four annas per single plant.

11. I would also suggest that a certain number, say 200, of each of the following species,—

Chinchona succirubra; *Chinchona Calisaya*; *Chinchona micrantha*; should be carefully planted in the shola behind "Mary Ville," or other sheltered slope and a careful record of their growth be registered.

12. The superintendent, Mr. Hannay, is an energetic man, accustomed to an Australian life, and skilled in mechanical appliances, but without special horticultural knowledge; his attention has been sometimes diverted to forest operations, and other works, to the prejudice of his duties in the garden; the importance of propagating extensively, by layers and cuttings, should be kept in view, and for this purpose, the small experimental plantation, mentioned in paragraph 11, should be formed with great care and attention.

13. There does not appear to be any fixed establishment; the monthly expenditure at present is—

	<i>Rs.</i>	<i>a.</i>	<i>p.</i>
Pay of the superintendent - - - -	120	-	-
Ditto - garden maistry - - - -	10	-	-
Ditto - six gardeners at <i>Rs.</i> 7. 8. each - - -	45	-	-
Ditto - six coolies at <i>Rs.</i> 6. 8. each - - -	39	-	-
Ditto - two peons at <i>Rs.</i> 5 each - - - -	10	-	-
Ditto - cooly maistry - - - -	15	-	-
Ditto - blacksmith - - - -	9	-	-
Ditto - carpenter - - - -	14	-	-
Ditto - Malayalum writer - - - -	8	-	-
Ditto - bullock driver - - - -	14	-	-
TOTAL - - - - <i>Rs.</i>	284	-	-

= *Rs.* 3,408, or £. 340. 16 s. a year, and with the objects in view, perhaps the expenditure might be raised to £. 500 a year, which is the sum set aside in Ceylon. If a like sum could be sanctioned in Travancore, the services of a skilled and practical horticulturist could be secured.

14. *Tea.*—

* *Note*—It should be remembered that though shelter is highly advantageous, the plants should not be overshadowed or exposed to the drip of other trees.—*See Mr. Melvor's Reports.*

† *Note.*—*Acacia lophantha*, a fast grower, and not affected by drought, is most useful for protecting plantations. Seeds of this species and of *A. Melanowylon* and *Mollissima* have been despatched to Mr. Hannay.

The *Cassia florida*, which flourishes so well at Bangalore, is hardy, and a fast grower. It should also be tried, as a thick interlaced screen might quickly be formed; directions will be given for the transmission of seed.

14. *Tea*.—The Neilgherry seed received in 1861 germinated freely, and there are now about 70 well formed bushes from two to four feet high in flower and fruit, 400 seedlings are available, and a large seed-bed has been prepared, and when the garden stock is sufficient, the seeds and seedlings should be distributed gratuitously, or sold at a moderate rate, such as would afford a fair profit to intending speculators, who would establish nurseries on their own account; the primary object being to disseminate selected seeds from the best grown varieties to all desirous of cultivating tea. The Neilgherry rates of one rupee per pound of seed, and 10 rupees per 1,000 seedlings might be adopted.

15. With regard to the quality of Travancore tea, nothing definite can be said until the leaf has been subjected to skilful manipulation; but it may be mentioned that Mr. Liddell, of Binny & Co., has shown me reports from professional brokers of London and Calcutta valuing tea, grown at Charter's Hope, in the Ariangole Pass (elevation 1,200 feet), at four shillings per pound.

16. It appears to be highly probable that this part of Travancore is well suited for tea culture, and therefore at least four acres of the Government garden should be planted with tea, to furnish seed of the best quality, as much disappointment has been experienced by Mr. Hannay and several of the planters in attempting to raise seed imported from Assam and the North West Provinces, the vitality of which had been lost in transit.

17. Coffee nurseries have been prepared on all the estates, so that unless it be for the convenience of planters, or for the self-maintenance of the garden, the coffee shrub need not be propagated.

18. *Vanilla*.—It seems doubtful whether this plant will thrive at Peermade; it has been grown, but has not flowered. Further experiments in sheltered sites are required, as the commercial value of the pod is great, with an increasing trade in Ceylon.

19. The tallow tree of China and Mauritius (*Stillingia sibefera*) which is cultivated in China and in the northern Provinces of India along with tea, might also be tried, for which purpose a few fresh seeds have been sent to Mr. Hannay. The varnish tree of China (*Elæococcus vernicifera*) might also be tried.

20. *Vegetables*.—Potatoes, onions and other kitchen vegetables, and rhubarb, might be grown to any extent for the supply of Quilon, Alleppey, Cochin and Trevandrum. Potatoes are sold at Ootacamund at 1½ rupees per maund, but are not delivered at Trevandrum for less than three rupees, and the supply is irregular.

21. *Fruits*.—Apples, pears and grapes have been tried, but do not thrive on the crest of the ghâts. In some of the valleys, oranges would do well; raspberries and strawberries were in fruit at the time of my visit. The mangostein has ripened at Courtallum, and might succeed here in a well-selected site.

22. SUMMARY.—To recapitulate, it seems desirable that attention should be specially given to the careful cultivation of chinchona and tea; extensive seed-beds should be formed, and ten acres of the former and four of the latter might be planted out. This would probably be sufficient to keep the chinchona nurseries amply supplied, and to furnish fresh tea seeds and seedlings for a fair extent of cultivation. Vanilla, potatoes and other products mentioned, should receive due care from the superintendent. Cotton does not appear to thrive, and might be excluded for the present.

23. *Superintendent*.—Having been requested to suggest the means best calculated to increase the utility of the garden, I have no hesitation in recommending that a skilled superintendent be procured from one of the best gardens in Europe, on a salary of (say) 150 rupees a month, with a residence. The object in view is to improve the culture of indigenous productions, at the same time to naturalize chinchona, tea, and other useful exotics, and to prepare both for distribution to the other settlements in these beautiful hills and plains. For this, horticultural skill and ability are essential requirements, meanwhile Mr. Hannay (whose services might be transferred to another department) should,

should, with a trained native gardener, propagate chinchona and tea to the best of his ability.

The following are the principal Trees found in the Sholas adjoining Peermade, observed during a hasty excursion.

No.	English Names.	Native Names.	Botanical Names.
1	- - - -	Palmaram - -	Bassia elliptica (Dalzell) or Isonandra acuminata.
2	Iron wood - -	Nauga - -	Mesua ferrea.
3	Anjelle - -	Angill, Ayence -	Artocarpus hirsuta.
4	Sack tree - -	Araya Anjelly -	Antiaris saccidora.
5	Gamboge - -	Mukki - -	Garcinia pictoria.
6	- - - -	- - - -	" " Kydū.
7	Rose apple - -	- - - -	Jambosa Munronū.
8	Indian plum - -	Narvelli - -	Syzygium.
9	Wild cinnamon -	Darchini - -	Cinnamomum iners.
10	- - - -	- - - -	Litsea Zeylanica.
11	- - - -	- - - -	Machilus macrantha.
12	Black dammer -	Congiliam maram.	Canarium strictum.
13	- - - -	Vellay naga - -	Conocarpus latifolius (known as Dinduca in Mysore).
14	- - - -	- - - -	Elæocarpus serratus.
15	Black wood - -	Eti maram - -	Dalbergia latifolia.
16	Ben-teak - -	Ben-teak - -	Lagerstroemia microcarpa.

Nos. 2, 8, 11, 13, 14, 15 and 16 yield excellent timber; black wood is found sparingly in the western, but abundantly on the eastern slopes.

Among the shrubs and herbaceous plants which especially attracted notice, were the following:—

Melastoma - - -	Torenia cordifolia (Sispara creeper).
Osbeckia - - -	Cœsilpinia (two species).
Urena - - -	Crotalaria (two kinds).
Solanun giganteum -	Exacum bicolor (Chiretta).
Erigeron (Coffee weed) -	Ophelia (vary) ditto.
Blumea - - -	Andrographis paniculata (Creyat).
Smithia.	

Impatiens (several species) and of the Seitamineous tribe, there are wild Cardamom, Ginger, Zedoary.

Hedychium and Phrynum dichotomum.

ORDER of the Madras Government, 21st February 1866.

MR. McIVOR will afford every assistance sought by the Resident in the way of furnishing his Highness the Maha Rajah with seeds and plants, and giving his Highness's employés facilities for becoming acquainted with the propagation and culture of the chinchona.

(signed) J. D. Sim,
Secretary to Government.

— IV. —

CHINCHONA CULTIVATION IN BRITISH SIKKIM.

— No. 1. —

FIRST ANNUAL REPORT on Chinchona Cultivation in British Sikkim from 1st April 1862 to 30th April 1863, by *T. Anderson*, Esq., M. D., Officiating Superintendent of the Botanic Gardens, Calcutta.

THE progress of the cultivation of the chinchona at Darjeeling under my direction was fully reported to the Lieutenant Governor of Bengal on the 6th August 1862, and the report was published in the supplement to the "Calcutta Gazette."

That report contained the history of the experiment from the despatch of the plants from Calcutta on the 24th March 1862 until the 1st August. In that report, I stated that the experiment might be considered as having commenced on the 1st of June, as from unavoidable delays in a district where carriage of all kinds was most difficult to procure, where skilled labour was scarce and extravagantly expensive, and where even the ordinary processes of gardening were quite unknown, I was obliged to keep the chinchona plants confined for two months in Wardian cases, some of them having been already subjected to five months of this confinement. The total number of plants with which the experiment was commenced on the 1st June was 211. On the 1st of August the number had increased to 1,611 of all kinds, of which, however, it is deserving of note that 1,300 were newly raised seedlings of *Chinchona Pahudiana*. In the end of August, Mr. Stubbs, the European gardener, who had accompanied the plants from Calcutta in March, suffered so much from continued illness of a serious nature, that I directed Mr. A. T. Jaffrey, who had just been appointed assistant gardener of the botanic gardens in Calcutta, to proceed at once to Darjeeling to receive charge of the cultivation from Mr. Stubbs, whom I intended, on his recovery, to recommend for appointment to the charge of planting the avenue of mahogany and other trees along the Ganges and Darjeeling road. Mr. Stubbs, however, died on the 26th September at Kursiong, where he had gone for change of air. Mr. Jaffrey received charge of the experiment on the 13th September. I again submitted a report on the 12th November, in which it was shown that the total number of plants in the nursery was 2,286, of which, however, 1,921 belonged to the doubtfully quiniferous species, *C. Pahudiana*, so largely cultivated by the Dutch in Java, leaving only 365 plants as the stock of the undoubtedly valuable species of chinchona. I made a visit of inspection to the chinchona nursery at Darjeeling in January. I left Calcutta on the 18th January, and returned to Calcutta on the 1st February. I then saw that my fears, that the height of Sinchal above the sea and the cold of the winter would seriously affect the condition of the plants, had been confirmed. Though there had been few deaths (not more than 50 of all species), yet the situation was so unfavourable that almost no cuttings or layers had been made since November. This was partly owing also to an untoward accident having happened to the flue in one of the two small propagating pits. The upper part of the flue immediately over the furnace had fallen in suddenly, causing the house to be filled with hot air and smoke, and doing great damage to the plants before the fire could be extinguished, and the plants removed to the other propagating house.

In January I had also an interview with Captain Fitzgerald, the executive engineer, under whose directions the road leading to the permanent site of the chinchona nursery was being made. He informed me that the difficulties he had met with in the opening out of this road were so great that the buildings and clearing of the forest could not be commenced until the road was finished,

and

and were not likely to be completed until April 1864 at the soonest. On learning this, I immediately endeavoured to obtain temporary occupation of a site, with a dwelling-house for the European gardener, at an elevation of 6,000 feet above the sea, and 2,500 lower than the temporary buildings at Sinchal. After I left Darjeeling, I procured the occupation for one year of a garden and dwelling-house at Lebong, a warm, well-sheltered spur below Darjeeling, at an elevation of 6,000 feet above the sea. The plants and all the stores were removed from the temporary buildings at Sinchal to this site in the first week of April. Although the distance was seven miles, the arrangements were so carefully made by Mr. Jaffrey, who personally superintended the removal of the plants, that only one plant of *Chinchona succirubra* was slightly damaged. The number of plants brought from Sinchal to Lebong on the 1st April were as follows :—

RETURN of Chinchona Plants in the Nurseries at Darjeeling on the 31st March 1863.

NAMES OF SPECIES.	Remaining on 31st October.	Remaining on 31st March.	REMARKS.
<i>C. succirubra</i> - - - -	213	328	The produce of 11 plants of this species brought from Ceylon on 28th January.
<i>C. Calisaya</i> - - - -	25	30	
<i>C. nitida</i> - - - -	61	100	
<i>C. micrantha</i> - - - -	51	80	
<i>C. Peruviana</i> - - - -	8	18	
<i>C. Condaminea</i> - - - -	None	31	
<i>C. Pahudiana</i> - - - -	1,921	1,892	
<i>C. species without name</i> - -	7	10	
TOTAL - - - -	2,286	2,489	

When the highly unfavourable circumstances under which the plants were placed are remembered, along with the fact that the propagation of *C. Pahudiana* had been entirely discontinued, the progress shown in this report is satisfactory enough; for the best species, those which it is my object to increase as rapidly as consistent with the healthy condition of the plant, had been increased from 365 on the 31st October, to 592 on the 31st March. On the 1st April, 327 plants belonging to the following species of chinchona were added to the stock at Darjeeling. These plants were obtained from Madras on the 31st January 1863; and of the original number, 350, received from Madras, only 23 had been lost between Calcutta and Darjeeling during the two months that had intervened from the date of their arrival in Calcutta, and their reaching Darjeeling. The numbers received are as follows :—

RETURN of Chinchona Plants received at Darjeeling, including those from Madras, on the 1st April 1863.

NAMES OF SPECIES.	Number of Plants received from Madras on 1st April.	Old Stock existing at Darjeeling on 1st April 1863.	Total Number of Plants at Darjeeling on 1st April 1863.
<i>C. succirubra</i> - - - -	97	323	420
<i>C. Calisaya</i> - - - -	21	30	51
<i>C. nitida</i> - - - -	44	100	144
<i>C. micrantha</i> - - - -	48	80	128
<i>C. Peruviana</i> - - - -	23	18	41
<i>C. Condaminea</i> - - - -	94	31	125
<i>C. Pahudiana</i> - - - -	None.	1,892	1,892
<i>C. species without name</i> - -	None.	10	10
TOTAL - - - -	327	1,484	2,811

Before concluding this general report on the experiment of cultivating chinchona in Bengal during the past official year, it seems to me that, in order to form an opinion of the comparatively great success that has attended the operations, a short recapitulation of the difficulties experienced at Darjeeling is necessary.

1st. I laboured under the disadvantage, last year, of being quite ignorant of the nature of the country of British Sikhim, beyond what I could learn from the accounts of Dr. Hooker, as well as from the collections of dried plants from Sikhim which exist in the Calcutta herbarium. I had formed very inadequate ideas of the difficulty of reaching Darjeeling, of the condition of the roads leading to it, and of the resources of the station as regards labour, especially such skilled labour as I required, such as native gardeners, carpenters, and masons. I also supposed that no difficulty would be experienced in obtaining abundance of land, the property of Government, in the neighbourhood of Darjeeling; that glass for the conservatory, and flowerpots, &c., could be procured in Darjeeling. Some idea, however, will be obtained of the difficulties with which the experiment had to contend when I state that no suitable Government land could be got nearer than 12 miles from the station, and that to reach this spot, an almost impenetrable forest had to be passed through, requiring every step to be cleared by Lepchas with their long knives. On leaving Calcutta, I had hoped that the permanent propagating house, the gardener's house, and huts for the coolies, would have been finished in three months. Instead of which, it soon appeared that until a bridle path, eight miles long, could be finished, the buildings could not even be commenced, and that, instead of three months being required to complete them, two years was the shortest time in which they could be ready. No temporary buildings could be obtained either, except barracks on the windy and cold crest of Sinchal, 8,600 feet above the sea. Before these could be converted into a conservatory, glass had to be procured from Calcutta, 400 miles distant. The manufactory of flowerpots was also unknown at Darjeeling, and so that even they had to be obtained from Calcutta. Then no labour of any kind could be got to supply the place of the two Bengallee gardeners, who insisted on returning to Calcutta within three months of their arrival at Darjeeling; and the European gardener had therefore to perform all the operations of the simplest kind with his own hand, and this is still the case. Such an apparently easily procurable substance, as white river sand, could not be got in Sikhim, not that none existed there, but during the rains, the beds of the rivers were so full of water that the beds of sand were all concealed. Accordingly, a maund of sand was sent for from the Botanic Gardens in Calcutta. No packages of any kind ever reached Darjeeling from Calcutta in less than six weeks, the usual time occupied in the transit being two months. It will thus be seen that the commencement of chinchona cultivation in Darjeeling entailed a great many preliminary operations before the propagation of plants could be attempted; and it is only now that with tools, flowerpots, bell glasses, and hand frames received from Calcutta, and a determination to be contented with such means as are procurable in Darjeeling, that the success I have been able to report has been obtained.

I am glad to be able to report that on my visiting the chinchona nursery at Lebong in the end of May, I found all the plants in the highest health, and that the propagation of all the species, except *Chinchona Pahudiana*, was advancing rapidly. On my return to Calcutta, I prepared a report for submission to the Lieutenant Governor, and which I intended to forward separately from the Annual Report. I, however, now enclose it in the form of an Appendix to the Annual Report.

Expenditure.—Provision was made for the experiment of introducing chinchonas into British Sikhim to the amount of Rs. 14,753. 3. 2. from the commencement of the experiment in March 1862, until the end of April 1863. Considerable errors occurred in the approximate calculations of the sums required for the various charges of the year, some exceeded, while others fell below the calculated sums. The general result shows that the cultivation was carried

carried on at a cost of Rs. 11,639. 2. 6. as appears by the annexed statement of the expenditure :—

STATEMENT of Expenditure incurred in the Period between 24th March 1862 and 30th April 1863, on account of the Introduction and Cultivation of Chinchonas in British Sikhim.

	Rs.	a.	p.
European gardener from March 1862 to 30th April 1863 -	1,998	6	2
Native gardeners - - - - -	266	7	-
Coolies and Sirdars - - - - -	677	11	10
House rent - - - - -	910	-	-
Travelling allowance for Europeans - - - - -	1,126	1	-
Ditto - ditto for Mallees - - - - -	12	9	3
Transit of Wardian cases, &c. - - - - -	1,302	7	9
Huts for Coolies, &c. - - - - -	25	-	-
Purchase and transport of flowerpots, tools, &c. - - - - -	2,330	3	11
Contingencies - - - - -	2,990	3	7
TOTAL - - - Rs.	11,639	2	6

The unexpected charge for procuring chinchona plants from Madras is included under the head of contingencies. As a European gardener and one Mallee were sent from Calcutta to Ootacamund for the plants, the sum incurred was considerable, amounting to Rs. 1,328. 15. 3.

APPENDIX.

From *T. Anderson, Esq., M.D.*, Superintendent of the Botanic Gardens, Calcutta, and in charge of Chinchona Cultivation, to the Secretary to the Government of Bengal, 25th July 1863.

1. I HAVE the honour to report, for the information of the Lieutenant Governor of Bengal, that the condition of the chinchona plants at Darjeeling on the 15th June was most satisfactory.

2. In accordance with the orders of the Right Honourable the Secretary of State for India, no attention has been given since the 1st April to the increase of the stock of *Chinchona Pahudiana*. The increase of the other species has been great, and the plants are in excellent condition, so much so indeed, that a plant of *Chinchona succirubra* had grown nine inches in 30 days. The number of all species on the 15th June was 4,620 (the corresponding number on the 1st June 1862 was 211), and these plants were so covered with rigorous shoots, that I calculated that 6,000 plants could be added to the number of all the species, exclusive of *C. Pahudiana*, by 15th August, making a total number of 10,000 plants on that date. The most marked increase has been in the number of plants of *Chinchona officinalis*, of which I proposed only 93 plants received from Ceylon and Ootacamund on the 1st May; these have been increased to 573 on the 15th June. Seven hundred of the large plants of *Chinchona Pahudiana* have been planted in the open air at an elevation of 6,000 feet, and though they have been fully exposed to all weathers from bright sunshine to heavy rain, they are growing much more luxuriantly than when they were under shelter. I have for some time been unable to distinguish botanically between the species supplied from the Ootacamund nursery under the names *C. micrantha*, *C. nitida*, *C. Peruviana*. These seem to me in their present state to be one and the same species, probably *C. micrantha*. I have therefore adopted that name provisionally, in hopes that some of the plants, with increase of age, will take on the specific characters of *C. nitida* and *C. Peruviana*. Mr. Thwaites, the director of the Botanic Gardens, Ceylon, and who has given much attention to the experimental cultivation of cinchonæ in Ceylon, finds also that from seeds supplied to him as *C. micrantha*, *C. nitida*, and *C. Peruviana*, only one species was procured, or, at least, as yet he had been unable to distinguish more than one species.

3. In the commencement of June 1863, I supplied Dr. Simpson, civil surgeon of Darjeeling, with about 2 lbs. of fresh leaves of each of the following species :

—*C. succirubra*, *C. officinalis*, and *C. micrantha*. Decoctions, prepared with water slightly acidulated with sulphuric acid, were very bitter, and three patients suffering from well-marked intermittent fever were cured by the administration of these preparations alone. Towards the end of June, Dr. Simpson and I endeavoured to examine chemically the nature of the leaves of chinchona succirubra. We experimented on 1 lb. of fresh leaves. Our mode of procedure was as follows:—The fresh leaves were boiled in water, in which a certain quantity of carbonate of soda had been dissolved, and the dark coloured liquor resulting was thrown away. The mass of leaves after having all the alkaline water pressed out of them, was boiled in water with a small quantity of sulphuric acid. This was repeated three times, and the leaves were carefully squeezed at the end of each boiling. These acid liquors were then mixed and concentrated by boiling. The bitter acid, concentrated liquor, was then treated with carbonate of soda, and the neutral bitter liquid was afterwards set aside to cool, in the hopes that crystals might be obtained. Crystallization did take place on glasses under the microscope. The crystals are long and needle-shaped, and were so abundant as to appear to the naked eye as a whitish spot in the glass. A thin film of crystals (sulphate of quinine) also formed in the surface of the fluid, and could easily be skimmed off. These dissolved in water slightly acidulated with sulphuric acid, tasted very bitter. At this stage, however, the process was arrested, notwithstanding the removal of colouring matter by animal charcoal. The detection of crystals at all, with the means at our disposal, was unexpected. As it is, the undoubted presence of little needle-shaped crystals in a fluid obtained from the leaves of chinchona is worthy of record.

4. The cultivation of chinchona in British Sikhim is certain to be commenced soon by private individuals. Five hundred plants have been procured by private individuals from Mr. McIvor at Ootacamund, but they nearly all died on the route, one plant having reached Darjeeling alive. However, I have applications for more than 15 lacs of plants, and I shall soon be able to supply a few.

RETURN of Chinchona Plants in the Government Nursery at Darjeeling, on the 15th June 1863.

NAMES of SPECIES.	Number on the 1st April 1863.	Number of Plants on 15th June 1863.
<i>C. succirubra</i> - - - - -	420	1,024
<i>C. Calisaya</i> - - - - -	51	53
<i>C. officinalis</i> - - - - -	125	573
<i>C. micrantha</i> - - - - -	323	695
<i>C. Pahudiana</i> - - - - -	1,892	2,275
TOTAL - - - - -	2,811	4,620

— No. 2. —

From the Secretary of State for India to the Government of India,
7th September 1863.

1. THE specimens of dried leaves of *Chinchona succirubra*, transmitted in your letter dated 11th June (No. 34) 1863, together with a copy of a communication from the Superintendent of the Botanic Garden at Calcutta, have been forwarded to Mr. Howard, the manufacturer of quinine.

2. That gentleman reports that the leaves are not so well preserved as those sent by Mr. McIvor, and that the quantity is so small that he cannot undertake to obtain as good a result from the analysis of these specimens as he did from those received last June from the Neilgherry Hills.

3. With my despatch, dated 16th July (No. 51) 1863, I transmitted copies of Mr. Howard's report on the results of an analysis of specimens of bark, dried leaves, and decoctions and infusions of leaves from the Neilgherry Hills; by which

which you will perceive that chinchona leaves contain quinine, as well as a large per-centage of kinovic acid. This discovery, the possibility of which was first suggested by Dr. Anderson, is likely to lead to most beneficial results to the people of India; while the very satisfactory issue of Mr. Howard's analysis of the barks grown on the Neilgherry Hills, has finally established the success, as well as the great importance, of chinchona cultivation.

— No. 3. —

REPORT on Chinchona Cultivation at Darjeeling, from the 1st April 1863 to 15th July 1864, by *T. Anderson, Esq., M.D.*, Superintendent of the Botanic Garden, Calcutta.

THIS report refers to the operations of a longer period than can be strictly included in the official year, but I have extended the period reported on to enable me to lay before the Lieutenant Governor, in the compass of one report, my proceedings up to this date in this important experiment.

The period to which this report refers may be considered as the second year of the experiment of cultivating chinchonas in the Himalaya, as the cultivation was commenced on the 1st June 1862. In the first annual report submitted on the 3rd August last year I referred to the numerous obstacles that had to be overcome before commencing the cultivation, as well as the difficulties that still continued to retard the more rapid increase of the stock of plants. Through more extended acquaintance with Darjeeling I have been able successfully to contend with many of these difficulties; but I am sorry to have to report that all my operations have been retarded, and much unnecessary labour incurred by the want of permanent buildings belonging to the cultivation, and situated on Government land near the site chosen for the open air cultivation. The propagation of the plants is still carried on at Lebong in a private garden, which I have been obliged to rent for a second year, that is, until the end of April 1865. This garden, besides a dwelling-house occupied by the European gardener in charge of the cultivation, had not a single appliance of any kind for carrying on cultivation beyond a small conservatory manufactured out of old doors and windows, and so dilapidated that it had to be abandoned six months ago. In its place a temporary conservatory, consisting of a glass roof and wooden sides, was erected in January. The glass and wooden frames for this conservatory were sent from Calcutta, as it was impossible to procure them in Darjeeling.

On finding that the nurseries could not be removed to the permanent site till the end of another year, I made arrangements for adding a flue to the conservatory erected in January, and also for building a second conservatory with a flue. This second conservatory was completed about 15 days ago, and the flue of the other house is also finished. These flues, though not required at this season, will be an invaluable aid in carrying on the propagation during the coming winter. Owing to the want of artificial heat propagation was almost entirely stopped during the winter months. Twenty-five large frames with glass lights, and of the form usually known as cucumber frames, were provided during the last year to meet the large increase in the number of plants. The rooting of the cuttings has always been carried on in these frames with the assistance of slight bottom heat, obtained from the decay of heaps of vegetable matter. A large number of additional frames will be required almost immediately, as the rate of increase in the plants has now reached 6,000 a month.

Propagation.—The last published record of the number of plants is that dated 15th June 1863. The total number of plants on that date was 6,530. The number on the 15th July was 19,516. As *Chinchona Pahudiana* was not increased at all during this period, it must be excluded from the table while calculating the rate of increase during the past year, which is then 400 per cent. It is, however, deserving of notice as showing the great suitability of the climate of Darjeeling for the species *Chinchona officinalis* (var. *Bonplandiana*) that the rate of increase of that species has been nearly 2,000 per cent. during the same period. The rate of increase is now most satisfactory, and the cuttings obtained monthly are large and healthy. Cuttings root from 15 days to three weeks,

depending on the amount of sunshine. They root more quickly in sunshine than they can do in rainy weather. As I have already stated, the entire absence of artificial heat and of suitable conservatories prevented me attempting any propagation during the winter months, December, January, and February. A small increase was obtained in March, and since then the propagation has steadily increased every month. It is now about 6,000 a month.

In the first Table below I have given the results of the various reports of the numbers of plants on certain dates.

The second Table contains a statement of the number of plants with which the experiment was commenced in 1862; also of the number of plants received in April 1863 from Ootacamund and Ceylon. The sum of these columns compared with the numbers of June 1863 and 15th July 1864 will show the satisfactory progress that has been made.

TABLE showing the Increase of Chinchona Plants at Darjeeling from 15th June 1863 to 15th July 1864.

NAMES OF SPECIES.	15th June 1863.	23rd August 1863.	1st November 1863.	1st April 1864.	15th July 1864.	REMARKS.
<i>Chinchona succirubra</i> - -	1,024	1,925	2,937	3,053	4,904	Not increased since 15th June 1863.
<i>Chinchona Calisaya</i> - - -	53	116	172	172	172	
<i>Chinchona officinalis</i> - -	573	1,261	1,889	2,930	10,460	
<i>Chinchona micrantha</i> - -	695	953	1,078	1,144	1,705	
<i>Chinchona Pahudiana</i> - -	2,275	2,275	2,275	2,275	2,275	
TOTAL - - -	4,620	6,530	8,351	9,574	19,516	

TABLE showing the Number of Chinchona Plants received at Darjeeling in 1862 and 1863, and the Annual Increase from them.

NAMES OF SPECIES.	Return of 1st June 1862.	Received from Ceylon and Ootacamund, 1st April 1863.	Return of 15th June 1863.	Return of 15th July 1864.	REMARKS.
<i>Chinchona succirubra</i> - - -	74	97	1,024	4,904	Eleven of these were re- ceived from Ceylon in January 1863.
<i>Chinchona Calisaya</i> - - -	5	21	53	172	
<i>Chinchona officinalis</i> - - -	- none -	105	573	10,460	
<i>Chinchona micrantha</i> - - -	79	115	695	1,705	
<i>Chinchona Pahudiana</i> - - -	53	- none -	2,275	2,275	
TOTAL - - -	211	338	4,620	19,516	

Site of Permanent Nursery and Road to it.—In the first report of the introduction of Chinchona cultivation at Darjeeling I mentioned that the only Government land I could obtain was situated 10 miles from Darjeeling; that to reach it a road had to be made through a private estate, and running through a dense forest of oak, chestnut, laurels, cherries, and maples. This road was commenced in June 1862. It starts from the Ganges and Darjeeling cart-road at the point where that road crosses the saddle below Sinchal, about three miles from Darjeeling. The road is not completed yet to its proper width of eight feet; in several places it is not more than two and a half to three feet wide, but it was passable for ponies by the middle of October 1863. Estimates have been called for widening the road to 10 feet, and in the meantime the executive engineer has been requested to have it completed to the estimated width of eight feet with as little delay as possible. Its length from the point where it leaves the cart road is stated to be seven miles and three-quarters, thus making the distance to the end of the road about 11 miles from Darjeeling.

The road terminates at a point about 6,000 feet above the sea in a forest consisting principally of *Michelia Cathcartii* and *lanuginosa*, *Bucklandia populifolia*, *Cyclodaphne*, *Alseodaphne*, *Prunus*, *Plectocomia*, and tree ferns, of which one specimen is 50 feet in height. The difficulty of erecting permanent nursery buildings at this distance from Darjeeling appears to me to be so great, especially after my experience of the difficulties of having any work rapidly finished even in the station of Darjeeling, that I endeavoured to procure a site for these buildings from Mr. Charles Barnes, whose large estates are contiguous to the Government land reserved for Chinchona plantations. That gentleman liberally asked me to choose any site I pleased to the extent of 10 acres, and I fixed on a suitable one in his estate near the tract where the open-air plantations will be formed. This site of 10 acres of level ground was made over to Government in perpetuity without any charge whatever, and under only one condition, that, should Government ever retire from the cultivation of Chinchona, and should wish to sell the buildings on the site given by Mr. Barnes, he or his heirs should have the option of buying the buildings at their cost price without any charge for the land in which they stand. I was permitted to accept the site on these terms. With the assistance of the executive engineer the sites for the European gardeners' dwelling-houses, the out-offices, and for the propagating-house were marked on the 13th November last. In the end of February I visited the site and found that all the places were being levelled for the buildings; that the preparation of the woodwork of one house was advancing slowly; and that a large number of bricks were being dried in the sun preparatory to burning them.

In the end of May little progress had been made in the buildings; the foundation walls of one house had been laid, about a lakh of bricks had been burnt, but the sites of other buildings had not even been levelled, and those for the out-houses had not been commenced. It seems probable now that all the buildings will be completed by the end of April 1865, by the time the second year's lease of the present nursery will expire.

Plantations.—In the middle of June 1864 I selected a suitable spot on the Government reserved land as the commencement of the open-air cultivation of Chinchona. This place is 3,743 feet above the sea as determined by the barometer, and is situated on the south-eastern slopes of a long spur from Sinchal. It is known to the Lepchas as Rungbee, and I have adopted this name for the plantation. The elevation of the lowest part of the spur is about 1,300 feet above the sea. The area of the land on it suitable for Chinchona cultivation is about 1,500 acres, from which a considerable deduction must be made for cliffs and rocky ground. Below 4,000 feet the land is partially cleared from the native cultivation of maize, millet, and eleusine. In the forest within the range adopted for Chinchona cultivation are found *Talauma Hodgsoni*, *Gordonia Wallichii*, three species of *Saurauja Actinidia*, several *Cucurbitaceæ*, several species of *Begonia*, *Sapindaceæ*, numerous *Labiataæ*, and at the lower altitudes, *Albizzia* and *Bauhinia*, with *Clerodendron* and *Callicurpa*, several *Acanthaceæ*, a lofty *Artocarpus*, and several species of *Ficus*. A large pellate-leaved *Rottlera* is found everywhere on the spur up to 5,000 feet. *Endogeneæ* are abundant; though not numerous in species, and of them *Musa* forms the most marked feature of the vegetation of the spur up to 5,500 feet. The trees are clothed with *Pothos*. Orchids and epiphytic species of *Zingiberaceæ* (proving the extreme moisture and equability of the climate). Four species of bamboo occur at different altitudes, one of them scandent and resembling in habit like the *Chusquea* Kunth of the Andes.

Palms occur of the genera *Plectomia*, *Calamus*, *Areca*, *Cargota*. Ferns of the most tropical genera are abundant, and tree ferns are common from the base of the spur to 6,000 feet. The temperature of the air at the plantation formed at 3,743 feet has been frequently recorded since the end of June; the maximum temperature observed is 78°, and the minimum 64°.

After having fixed on the site for a plantation a road had to be made to it through the dense jungle. From the point in the forest where the road made by the Public Works Department ends, a path has been made five miles in length; the first part through tangled and prickly masses of *Plectomia*, and this was completed to the first plantation by the end of June, when the ground was also ready for the plants, having been cleared, trenched, and surface drained.

At the nursery at Lebong the Chinchonas intended for planting out were removed from their pots, packed in baskets with cocoanut fibre, and carried by coolies to the forest. Tents had been pitched there for the European gardeners, Mr. Mann and Mr. Jaffrey, who were engaged in planting out the Chinchonas during the three following days. The plants, varying from one foot to two and a-half feet in height, were placed five feet apart, each species by itself, and were left perfectly unprotected from the weather. A light fence was placed round the plantation to keep off cattle and wild animals.

The number of Chinchonas placed in the plantation :

Chinchona	succirubra	-	-	-	-	-	-	-	100
"	officinalis	-	-	-	-	-	-	-	100
"	micrantha	-	-	-	-	-	-	-	50
"	Calisaya	-	-	-	-	-	-	-	2
"	Pahudiana	-	-	-	-	-	-	-	271
TOTAL - - -									523

From this experimental plantation at 3,743 feet important results will, I hope, be obtained, as the comparative growth of plants of the different species alongside of each other and under the same condition will enable me to form an opinion of the altitudes best adapted to each. From this point the plantations to be formed next year (30 or 40 acres for all species exclusive of *Chinchona Pahudiana*) will radiate in all directions according to what are found to be the requirements of the plants. The plants were not in the most satisfactory state for experimenting on, as from their rapid growth and large size no further time could be lost either in planting them or making cuttings from them. They were therefore taken direct from the warm equable air of the green-house, and they will have greater difficulties to contend with than if they had been inured by degrees to the open air and all kinds of weather. All plants grown in the conservatories will, in future, go through the process called by gardeners "hardening off" before they are planted in the open ground. Sheds have been erected at the plantation at three different heights, at 3,743, 2,500, and 1,760 feet above the sea. In these I have placed a considerable number of all the species (in the lowest *C. succirubra* alone), which having yielded a great many crops of cuttings have become exhausted. By exposure to the open air they will after a while yield more vigorous cuttings than they have done lately, and afford at the same time some data concerning the comparative rate of growth of the species at different altitudes.

Seeds—In April last I received 200 seeds of *Chinchona Calisaya* from Dr. Junghuhn. The seeds were produced in Java by one of the trees brought by Dr. Junghuhn from the Botanic Garden, Leyden, where it has been raised from seed sent from Bolivia by Dr. Weddell, the French botanist. Only nine of these seeds of this valuable species have germinated, but the young plants obtained are healthy and have already three pairs of leaves. In the same month I received a quantity of seed of *Chinchona Pitayensis* from Mr. Markham. The seeds were sent to Mr. Markham from South America.

They were sown at Darjeeling in the first week of May in a slightly warm frame, but up to the 15th of July not one of them has germinated.

Establishment.—I am indebted to Sir W. Hooker for having nominated Mr. Gustav Mann for employment in the cultivation of Chinchona at Darjeeling. Mr. Mann had just returned from the West Coast of Africa, where he greatly distinguished himself in the capacity of Government botanist under the orders of the Admiralty. Mr. Mann arrived in India on the 14th March last, and he has been appointed head gardener in charge of the Chinchona cultivation at Darjeeling.

Mr. Jaffrey is attached to the cultivation as assistant gardener. Mr. Ryan as overseer has proved most useful in taking a general superintendence of the coolies; though not a trained gardener he has acquired several of the minor operations of gardening. It has been impossible to procure any class of natives except the lowest coolies. No sooner are these people taught to do the most ordinary work of the nursery without constant European superintendence than they, either tired of the nature of the work or from some other cause, and almost usually

usually without any notice, abscond with wages due to them. The annoyance and unnecessary waste of time in teaching fresh gangs of coolies, only to be deserted by them in a month or two, have become so serious an evil that I shall immediately on my return to Calcutta endeavour to procure a party of dhangur coolies on an engagement to remain in Darjeeling at least for two years. To secure such men, a larger rate of wages must be given than I have estimated for.

Since last year the cultivation of Chinchona has been successfully commenced by two private individuals near Darjeeling, the plants having been obtained partly from Ootacamund and Ceylon. In one case the cultivation is carried on a scale which it is evidently intended to extend with the increase of the plants. A European gardener conducts the operation, and the plants in the nursery already exceed 1,000. The other experiment is on a smaller scale, and has been entirely conducted in the open air at an elevation of about 3,000 feet, and with only one species, *C. succirubra*, but also with success. I have had application from other proprietors of tea estates for assistance and advice in commencing similar experiments here, and in all cases I have rendered every assistance in my power.

T. Anderson, M.D.

— No. 4. —

From Sir Charles Wood to the Government of India.

24 February 1864.

1. Your letter, dated August 19th (No. 41) 1863, transmitting Dr. Anderson's Report on the cultivation of Chinchona plants in British Sikkim, has been under my consideration in Council, and I regret to find that the initiation of this important experiment in the neighbourhood of Darjeeling has been attended by so many difficulties and so much delay. Even now it appears that Dr. Anderson has only obtained the temporary occupation of a garden for one year, and that the preparation of a permanent site for a Chinchona plantation has not even been commenced. Your Excellency will doubtless take every suitable opportunity of fostering the plantations undertaken by your Government, and of encouraging the efforts of private enterprise to introduce the cultivation of these valuable plants into districts where it is likely to be attended with success.

2. With regard to Dr. Anderson's adoption of a single name for the three species of Chinchona plants yielding *grey bark*, I am of opinion that the change is likely to be attended with much inconvenience. The distinction between these three kinds is, as Dr. Anderson says, a matter of development, and no doubt the young plants are much alike; but it is equally certain that the specimens of bark and other parts of mature trees of the three kinds, as brought from Peru by Mr. Pritchett, differ very considerably. It is important that these distinctions should be indicated, especially when specimens of bark are sent to England for analysis; and as, owing to the immature state of the plants, there cannot be any scientific grounds, at present, for Dr. Anderson's change, it will be more convenient if in future he would indicate the number and condition of the three different kinds, *C. micrantha*, *C. Peruviana*, *C. nitida*, instead of placing them all under one name in his reports.

3. I shall watch with much interest the progress of Dr. Anderson's experimental cultivation at Darjeeling, which, considering the numerous difficulties to be overcome, appears on the whole to have made satisfactory progress; and I trust that such private undertakings as that of Dr. Lees in the Kangra Valley, and of Mr. Warren in Assam, will receive every legitimate encouragement from your Government.

— No. 5. —

From Sir *Charles Wood* to the Government of India.

29 February 1864.

1. I HAVE given directions for the transmission of 13 copies of Mr. Howard's work on Chinchona plants ("Nueva Quinologia de Pavon") for distribution in your Presidency. It will be valuable for purposes of reference to all persons who are interested in Chinchona cultivation; and copies might usefully be supplied to the public libraries in Calcutta, to the station libraries in hill districts, to the conservators of forests, and to the offices of commissioners and collectors in districts where Chinchona plants have been or are likely to be brought under cultivation. Copies might also be given to private individuals, such as Dr. W. Nassau Lees, who may be desirous of cultivating Chinchona plants.

2. Dr. Anderson, who is in charge of the Government Chinchona Nursery in Sikkim, is already furnished with a copy of this work.

— No. 6. —

REPORT on Chinchona Cultivation at Darjeeling during the Month of January 1865.

From *T. Anderson*, Esq., M.D., Superintendent of the Botanic Gardens, to *S. C. Bayley*, Esq., Junior Secretary to the Government of Bengal.

13 February 1865.

I HAVE the honour to submit the first of a series of monthly reports on the cultivation of Chinchona at Darjeeling. These monthly reports will contain, besides the account of the operations of the past month, a Tabular Statement of the growth of certain carefully measured plants of different species of Chinchona grown in the ground, in the open air, without shelter of any kind, in five plantations which have been formed at different elevations above the sea.

At the time of the submission of the last report on the cultivation of Chinchona, dated 15th July 1864, the cultivation was carried on in conservatories and in glazed frames at Lebong. The success attending the small open-air plantation at Rungbee, the formation of which was fully detailed in the last paragraphs of that report, induced me, in November and December, to remove all the Chinchona plants from Lebong to Rungbee. After the removal of the plants to Rungbee, the frames at Lebong, about 40 in number, were also taken to Rungbee and were filled with the smallest plants, while all the lately-rooted cuttings, but which were still in pots, were transferred to open-air beds, formed in parallel lines on a gentle slope. The plants were placed nine in a row, at six inches between each plant, each bed being about 200 feet long.

Three such beds were filled with young plants of *Chinchona officinalis* by the 15th of December. It was found better to remove all shade from the plants and to expose them fully night and day. The plants in these beds will be grown to yield cuttings. It is intended to keep 20,000 plants of each species for this purpose. After this number of stock-plants has been completed, all plants produced will be placed for a short time in beds situated near the ground, to be permanently planted. After remaining two or three months in these beds, or until they are 12 inches high, the plants will be placed in the permanent bark-yielding plantations at a fixed distance from each other, probably five feet apart.

The statement of the number of plants shows that, as 19,329 plants of *Chinchona officinalis* exist at Rungbee, the number of stock-plants of that species has been almost attained. The number will be completed in a week or two. These stock-plants will be allowed to grow for some time before cuttings are taken from them to form bark-yielding plants, as I am convinced that it is better to wait a short time for vigorous shoots than to swell up the monthly return by weak ill-formed cuttings, whose slowness of growth will never be compensated by their number. The number of the other species is still so far below what I require for stock purposes that all the cuttings obtained during the next five months at least will be added to the number of cutting-yielding plants. The reports of

of the value of *Chinchona Pahudiana* are so conflicting that it does not appear advisable to abandon entirely the cultivation of this species. Sir William Hooker, in a letter of the 8th January 1865, writes to me that some well-known chemists seem to think more favourably of it now, and that Professor Miquel has informed him that *Chinchona Pahudiana* and *Chinchona Carabayensis*, Wedd., are the same.* This important identification was pointed out to me two years ago by Mr. Alan Black, the learned curator of the Royal Herbarium at Kew, on my forwarding to Kew flowering and fruiting branches of *Chinchona Pahudiana* from Java. This identification adds nothing to the commercial value of *Chinchona Pahudiana*. The tables in this report show the number and distribution of the plants of all species on the 1st February, and the growth during January of the measured plants. The short report by Mr. Mann on the condition of the plants is also given in full.

* Note.—These two species are quite distinct,—*C. R. M.*

NUMBER and Distribution of Chinchona Plants in the Government Plantation at Darjeeling on 1 February 1865.

N A M E OF SPECIES OF CHINCHONA.	Number in permanent Plantation.	Number of Stock Plants for Propagation.	Number of Seedlings or Rooted Cuttings in Nursery Beds for permanent Plantations.	Number of Rooted Cuttings in Cutting Beds.	Number of Cuttings made during the Month.	Total Number of Plants, Cuttings, and Seedlings.
<i>C. succirubra</i> - - - -	389	2,731	- none -	- none -	1,660	4,780
<i>C. Calisaya</i> - - - -	- none -	23	- - -	- - -	- none -	23
<i>C. micrantha</i> - - - -	15	569	- - -	- - -	360	944
<i>C. officinalis</i> , including varieties -	50	11,479	- - -	- - -	7,800	19,329
<i>C. Pahudiana</i> - - - -	92	- - -	5,000	- - -	- none -	5,092
TOTAL - - - -	546	14,802	5,000	- none -	9,820	30,168

GENERAL REPORT on the Condition of the Plants with reference to the headings of the columns, and on the Operations of the past Month, by Mr. G. Mann, Assistant Conservator of Forests, British Sikkim.

THE number of plants planted out permanently in October 1864, has been increased by the planting out of 260 *C. succirubra* at the lowest plantation.

The number of stock-plants has not been increased during the month, but remains the same as found by counting on the 1st December 1864, as growth has been very slow.

The seedlings of *C. Pahudiana* intended for permanent plantations remain still in the frames, and of the remaining species the plants in hand have not yet exceeded the number intended to be kept for stock-plants.

The number of cuttings made during the month amounts, as shown above, to 9,820, which were made on warm beds got up out of leaves, &c., cut on the spot, and are doing remarkably well.

The condition of the plants is in the highest degree satisfactory, considering the removal of almost all from Lebong to Rungbee, a distance of about 20 miles.

The work chiefly done during the month consists of having made the above-mentioned cuttings, planting in permanent plantation of 260 *C. succirubra*, and preparing of beds for the stock-plants for propagation and planting out of 2,100 plants of *C. officinalis*, in addition to 6,659 which were planted out in November last.

New roads have been cut out at four different places and are partly open, and have given us access to different portions of the reserve lands intended for plantations as the plants increase.

— No. 7. —

From T. Anderson, Esq., M.D., Superintendent, Botanical Gardens, to S. C. Bayley, Esq., Junior Secretary to the Government of Bengal.

Sir,

13 March 1865.

I HAVE the honour to submit the report on the cultivation of Chinchona at Darjeeling during the month of February 1865.

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The month has been less favourable for growth than January, as the cold which has been quite as great as in January, has been accompanied by a very dry state of the atmosphere. Hail fell on the 3rd of the month and rain on five days, but with the exception of the 25th and 26th of the month only in slight showers, which did no benefit whatever to the *Chinchona*. The slight increase that appears in the table of growth took place almost entirely during the last five days of the month, with the exception of the lowest plantation, where about the 17th the plants began to show the first symptoms of the return of spring. At the first plantation (5,500 feet above the sea) the temperature has been very low, causing the destruction of at least three plants of *Chinchona Pahudiana*, and affecting a few of *Chinchona officinalis*. At the second plantation (4,350 feet above the sea) hoar frost occurred in several nights in February, but no damage has been done to any plants at this elevation. No frost was observed below this plantation. Observations on the temperature for the air have been made with more or less regularity during the month at the third, fourth, and fifth plantations. At the fourth plantation (2,500 feet above the sea) the maximum and minimum temperature in the shade was recorded every 24 hours during the month. The mean maximum temperature of the month at this elevation was 66.18, the mean minimum 47.93, and the monthly mean temperature 57.05. At the fifth, the lowest plantation, altitude 1,825 feet, fewer observations were made, as the plantation was not visited daily by the person observing; the results from the detached observations there give 71.56 as the mean maximum, and 47.77 as the mean minimum, and 59.5 as the mean temperature of the month.

The number of plants in the open ground for yielding bark has been increased by 220 plants of *Chinchona officinalis* taken from the number of plants intended to be kept for cuttings. The 9,820 cuttings made during last month have all rooted without a single exception, and have accordingly been transferred to the column of rooted cuttings. They will be planted during March in the beds for stock plants, and for permanent plantations.

No cuttings were made during the month, as no room could be provided until the cuttings made in January are disposed of, and besides the plants from which the cuttings are to be made, have only recently been planted in the open-air beds; after so sudden a change it is not advisable to run the risk of injury by removing leaves and branches as must be done in preparing cuttings.

The work done during the month consists of making roads, clearing and preparing jungle land for the permanent plantations, making terraced beds for nurseries, erecting sheds for coolies employed on the plantation, and temporary houses for the Europeans engaged in the cultivation. All the stores left at Lebong pending the erection of godowns at Rungbee have been removed during the month, and the temporary nursery at Lebong, where the cultivation has been carried on since 1st April 1863, has been entirely abandoned.

NUMBER and Distribution of *Chinchona* Plants in the Government Plantation at Darjeeling on 1 March 1865.

NAME OF SPECIES OF CHINCHONA.	Number in permanent Plantation.	Number of Stock Plants for Propagation.	Number of Seedlings or Rooted Cuttings in Nursery Beds for permanent Plantation.	Number of Rooted Cuttings in Cutting Beds.	Number of Cuttings made during the Month.	Total Number of Plants, Cuttings, and Seedlings.
<i>C. succinubra</i> - - - -	389	2,731	- none -	1,660	- none -	4,780
<i>C. Calisaya</i> - - - -	- none -	23	- - -	- none -	- - -	23
<i>C. micrantha</i> - - - -	15	569	- - -	360	- - -	944
<i>C. officinalis</i> , including varieties -	270	11,259	- - -	7,800	- - -	19,329
<i>C. Pahudiana</i> - - - -	92	- none -	5,000	- none -	- - -	5,092
TOTAL - - -	766	14,582	5,000	9,820	- none -	30,168

ABSTRACT of Mr. G. Mann's Report.

At the middle plantation, 220 plants of *Chinchona officinalis* have been planted out permanently during the month, and continue to grow as much as could be expected this season, which has been so unusually dry that in many of the tea estates, a large proportion of the young tea plants have been destroyed, and which has rendered the operation of transferring plants from frames in the open ground more laborious than usual, as constant watering was required.

No cuttings have been made during the month, as it was considered advisable to remove the plants from the frames into the open-beds for stock plants undisturbed.

The cuttings made during the month of January are all rooted without exception, and without any loss, but remain still in the frames to be gradually hardened for the transfer into open beds.

A frame has been planted with twenty-two *Chinchona officinalis*, and the same number of plants of exactly the same size have been planted out at the same time in an open bed to obtain results regarding the difference in the condition and number of cuttings obtained by the different methods of cultivation to be able to judge if it would be advisable to keep all the stock for propagation under glass.

During the month, three plants of *Chinchona Pahudiana* were killed by frost at the highest plantation, which however must partly be ascribed to their small size, as larger and sturdier plants on the same spot suffered, but were not killed.

The 2,100 plants of *Chinchona officinalis* planted out last November have been planted further apart, viz., from 6 inches to 18 inches, and in addition to the 8,759 plants which were in the open beds at the end of January, 2,500 more have been planted out on thirty-eight terraces, and are doing remarkably well, and would have done better if we had had rain in December, as is usual here in the hills.

The condition of the plants is excellent, and the greater suitability of Rungbee than of these places, where the cultivation had to be carried on formerly until we gained access to Rungbee, vouchsafes much more rapid progress in the experiment this year than it was possible to make before.

(signed) G. Mann.

— No. 8. —

From T. Anderson, Esq., M.D., Superintendent, Botanical Gardens, and in charge of Chinchonæ Cultivation in Bengal, to S. C. Bayley, Esq., Junior Secretary to the Government of Bengal.

Sir,

10 April 1865.

I HAVE the honour to transmit herewith the Report of the Chinchonæ Cultivation at Darjeeling for the month of March 1865.

REPORT on the Cultivation of Chinchonæ at Darjeeling during the Month of March 1865.

Now that the Chinchona plants are nearly all in the open air, the progress of the cultivation is much more dependent on the nature of the weather than when the plants were grown in conservatories, where the external cold could be counteracted by flues containing heated air, and where the moisture in the atmosphere could be increased or diminished according to the requirements of the plants.

In the open air the plants are in a much more natural condition than in conservatories; but this alteration in the cultivation requires me to record generally the meteorological conditions of the month, in order to show how the growth made during the month, and the operations of making cuttings, planting out, &c., and other works performed, have been affected by the weather.

The drawing up of rules for the guidance of those growing Chinchona, and the deciding of the very important questions of which is the best season for making cuttings, of forming permanent plantations for bark, and, above all, the time when bark can be most easily removed from the trees and dried. The time selected for the latter operation must be that of least growth, and this period will be most favourable, should it coincide with the driest and sunniest season of the year.

Meteorological records are kept in the open-air plantation, but for want of time these have been fully kept only at one plantation.

During March the weather has been extremely dry, the sky has been clear and cloudless, and though the sun has been very powerful, raising the thermometer to a mean maximum of nearly 80° at the lowest plantation; but, from the great radiation occurring during the still cloudless nights, the mean minimum temperature has been very low. The natural dryness has also been much increased by the extensive fires that have been raging all round; these have been caused by villagers burning the jungle for cultivation during the approaching rainy season.

At the fourth plantation the mean maximum during the month was 74°68'; the mean minimum 53°55'; mean temperature 64°11'.

At the fifth and lowest plantation the mean maximum temperature has been 78°89', the mean minimum 53°8', and the monthly mean temperature 66°34'.

These are not conditions favouring the growth of any plants, and certainly not of *Chinchona*, which require abundant moisture in the air, and an equable temperature.

Though the growth has been small, still there is a marked increase on that of February, and the plants are in perfect health, and have not suffered in the least degree from the dryness of the air.

Four hundred and twenty plants of *Chinchona officinalis* have been planted out in the bark-yielding plantation No. 3, 3,715 feet above the sea. Only 7,214 cuttings have been made during the month.

The nursery for the distribution of *Chinchona* was commenced during the month. Due notice will be given before any sale of *Chinchona* takes place. I expect to be able to distribute at least 1,000 plants on the 1st July. The plan I propose to adopt will be submitted for the approval of the Lieutenant Governor as soon as I can form an estimate of the number of plants I can dispose of during the year.

NUMBER and Distribution of *Chinchona* Plants in Government Plantation at Darjeeling, 1 April 1865.

NAME OF SPECIES OF CHINCHONA.	Number in permanent Plantation.	Number of Stock Plants for Propagation.	Number of Seedlings or Rooted Cuttings in Nursery Beds for permanent Plantations.	Number of Rooted Cuttings in Cutting Beds.	Number of Cuttings made during the Month.	Total Number of Plants, Cuttings, and Seedlings.
<i>C. succirubra</i> - - - -	389	2,731	- none -	1,660	2,250	7,030
<i>C. Calisaya</i> - - - -	- none -	23	- - -	- none -	14	37
<i>C. micrantha</i> - - - -	15	569	- - -	360	350	1,294
<i>C. officinalis</i> , including varieties -	690	10,839	- - -	7,800	4,600	23,929
<i>C. Pahudiana</i> - - - -	92	- none -	5,000	- none -	- none -	5,092
TOTAL - - - -	1,186	14,162	5,000	9,820	7,214	37,382

During the month 420 *C. officinalis* have been planted out permanently at plantation No. 3, and are doing well.

The condition of the stock plants of *C. officinalis* in the open air has changed but little, as the atmosphere is extremely dry in consequence of the rapid increase of temperature, and the reckless destruction of all the vegetation around us by the natives, who are clearing the land at present for their crops; and for the last fortnight all the slopes have been in a continued blaze all around the spur on which the *Chinchona* cultivation is carried on just now.

During the month, 7,214 cuttings have been made. An unusually small number of these are *C. officinalis*, as the plants were partially checked by their removal from the frames into the open air, and because it was considered necessary that these stock plants should be allowed to make young and strong wood again before cutting them down for propagation.

The permanent planting out of the *C. Pahudiana* has been deferred on account of the parching dry weather we have had until now. The condition of the plants must be considered excellent, as, although growth has been slow, they have improved in appearance, and their roots have got well distributed in the ground, so that a luxuriant growth will no doubt commence as soon as the atmosphere becomes moister than it is at present.

The plants at Lebong last year were not so forward on the 1st of May as they are now at Rungbee.

The operations of the last month consisted in making the above-mentioned cuttings, planting out of *C. officinalis*, preparing beds for the stock plants of *C. succirubra*, and cleaning of a site for *C. Pahudiana*, and the construction of artificial watercourses for the watering of the beds containing the stock plants, which has enabled us to prevent the plants suffering, although we could not accelerate their growth, as the evaporation was most rapid and the country around us is so excessively dry, and this rapid evaporation naturally causes a reduction in the temperature of the air immediately around the plants.

— No. 9. —

From *T. A. Anderson, Esq., M.D.*, Superintendent of the Botanical Gardens, to
S. C. Bayley, Esq., Junior Secretary to the Government of Bengal.

Sir,

Darjeeling, 22 May 1865.

I HAVE the honour to submit the following report on the cultivation of *Chinchona* at Darjeeling during the month of April 1865.

REPORT on the Cultivation of *Chinchona* at Darjeeling during the Month of April 1865.

THE weather during the first fortnight of April differed little from the weather that prevailed during March, but foggy and cloudy days were commoner.

With the exception of a slight thunder storm on the 13th, no rain fell until the 14th. After that date rain fell on 14 days to the amount of 11·18 inches, or the total rainfall for the month. The latter part of the month of April was therefore very moist and warm, and highly favourable to growth.

At the fourth plantation, the mean maximum temperature during the month was 74·5, the mean minimum 60, and the monthly mean temperature 68·5.

At the fifth and lowest plantation, the mean maximum temperature was 85·4, the mean minimum 62·3, and the monthly mean 73·6. These figures indicate a great increase in the minimum temperature as compared with last month, while the mean maximum temperature at the fourth plantation has fallen slightly below that of March. These changes in the relation of the two extreme temperatures have resulted in a great increase of the mean temperature of the month.

2. The growth of the plants has everywhere been most satisfactory, and, especially at the lowest plantation, the condition of the plants of all species could hardly be surpassed.

The plants are covered with luxuriant foliage, and the largest are sending out vigorous branches from the axils of the three or four upper pairs of leaves.

3. The total number of plants and partially-rooted cuttings of all species was 49,486 on the 30th April. The number permanently planted out was 3,256. The number of plants added during the month to the number to be retained as stock plants was 9,820; all of these belonging to *Chinchona officinalis* were planted in beds in the open air.

The increase by cuttings during April far exceeds the number obtained; since the commencement of the experiment 12,104 cuttings of all species were made. None of these are buds; only vigorous shoots were used, as I consider it preferable to have healthy stock than a large monthly increase of cuttings taken from over-pruned plants. The 7,214 cuttings made during March have all rooted, and are ready to be potted off as soon as the establishment have completed the more urgent work of preparing ground for the rapidly increasing stock of plants.

4. In the Report for the month of February, I stated that an experiment had been made to ascertain the difference in the number of cuttings obtained from plants growing under glass and those growing in the soil and fully exposed. After two months, it has been found that the plants under glass yield a larger number of cuttings than plants entirely unprotected do. The proportion is three to five. No general reliable results can be obtained until the experiment has been carried on for a year; during the rains the plants in the open air will grow most luxuriantly, and will give a much larger proportion of cuttings than they have done during the dry season.

5. The operations at Runghee during April, in addition to the making of cuttings and the planting in the open air beds of 9,820 plants, consist of planting *Chinchona Pahudiana* in permanent plantations, making drains in nurseries and plantations and repairing the roads, all of which were much damaged during the heavy and sudden falls of rain occurring during the latter part of the month.

6. A new road, giving access to the southern slope of the spur has also been finished during the month. The nursery for the distribution of *Chinchona* plants has been commenced during the month by 1,000 cuttings of *Chinchona officinalis* having been placed in it.

Tables showing the number, distribution, and growth of *Chinchona* plants in the Government plantation at Darjeeling on the 1st May 1865:—

NUMBER and Distribution of Chinchona Plants in the Government Plantation at
Darjeeling, 1st May 1865.

NAME OF SPECIES OF CHINCHONA.	Number in permanent Plantation.	Number of Stock Plants for Propagation.	Number of Seedlings or Rooted Cuttings in Nursery Beds for permanent Plantation.	Number of Rooted Cuttings in Cutting Beds.	Number of Cuttings made during the Month.	Total Number of Plants, Cuttings, and Seedlings.
<i>C. succirubra</i> - - - -	389	4,331	- none -	2,250	3,820	10,850
<i>C. Calisaya</i> - - - -	- none -	23	- -	14	24	61
<i>C. micrantha</i> - - - -	15	929	- -	350	260	1,554
<i>C. officinalis</i> , including varieties -	690	18,639	- -	4,600	8,000	31,929
<i>C. Fahudiana</i> - - - -	2,162	- none -	2,930	- none -	- none -	5,092
TOTAL - - -	3,256	23,982	2,930	7,214	12,104	49,486

— No. 10. —

From Sir Charles Wood to the Government of India.

Sir,

16 May 1865.

I HAVE received and considered in Council your letter, dated 31st January 1865, and am very glad to perceive that the accounts of the growth of the Chinchona trees at Darjeeling are so satisfactory.

— No. 11. —

From *T. Anderson*, Esq., M. D., Superintendent of the Botanical Gardens, to
S. C. Bayley, Esq., Junior Secretary to the Government of Bengal.

Sir,

Darjeeling, 12 July 1865.

I HAVE the honour to submit the annexed Report on the cultivation of Chinchona at Darjeeling during the month of May 1865.

REPORT on the Cultivation of Chinchona at Darjeeling during the month of May 1865.

THE month was marked by great increase in the moisture of the atmosphere and by frequent showers, with bright sunny intervals followed by warm cloudy nights. Rain fell very generally throughout the month, there having been only eight days on which rain did not fall. The total rainfall at the fourth plantation was 14·5 inches.

At the fourth plantation the mean maximum temperature during the month was 80, the mean minimum 62·4, and the monthly mean temperature 71·7.

At the fifth plantation the mean maximum temperature was 83·8, the mean minimum 63·2, and the monthly mean temperature 70·6.

The changes that have occurred in these figures compared with the same records for April, show the near approach of the rainy season, while they indicate atmospheric conditions much more favourable to vegetation than the weather that prevailed in April. The equalising influence of the increased moisture is shown by the increase of the temperature at the fourth plantation, while it has reduced the great heat of the air at the fifth plantation, as shown by the maximum and mean temperatures for April and May, while it has raised the mean minimum temperature of May by nine-tenths of a degree.

2. These changes in the temperature and moisture of the air and the increased rainfall during the month have favoured the growth of all the species of Chinchona.

The increased vigour of the plants was, however, noticed only from the third plantation downwards at the two upper plantations, have not yet experienced the full force of the warm rain with which Sikhim is deluged during the 1st of June until the end of the rainy season.

3. The monthly growth, as indicated by the record of carefully measured plants, is perhaps best shown in a Tabular Statement of the greatest and best growth of each species at the different heights:—

TABLE

TABLE showing the Maximum and Minimum Growth of Species of Chinchona during May, at five different altitudes.

N A M E OF S P E C I E S.	First Plantation, Maximum and Minimum Growth.	Second Plantation, Maximum and Minimum Growth.	Third Plantation, Maximum and Minimum Growth.	Fourth Plantation, Maximum and Minimum Growth.	Fifth Plantation, Maximum and Minimum Growth.
	<i>Inches.</i>	<i>Inches.</i>	<i>Inches.</i>	<i>Inches.</i>	<i>Inches.</i>
<i>C. succirubra</i> - - -	- - -	- - -	- - -	1½ to 4½	1½ to 6
<i>C. micrantha</i> - - -	- - -	- - -	- - -	1½ to 5½	4 to 10½
<i>C. officinalis</i> - - -	½ to 1	½ to 1½	1½ to 2½	1½ to 8	1 to 6
<i>C. Pahudiana</i> - - -	½ to ¾	2 0	1½ to 4½	1½ to 7½	1½ to 7½

The greatest growth during the month among the measured plants occurred in a fine plant of *Chinchona micrantha* at the lowest plantation, where this species is in the most perfect health. The most vigorous growth in *Chinchona succirubra* is also at this plantation. *Chinchona officinalis*, however, grows faster and is healthier in the cooler air of the fourth plantation.

4. The stock plants continue to grow well, and although they do not give the same amount of cuttings that could be obtained if the plants were grown under the protection of glass, still the cuttings are vigorous and healthy.

The number of cuttings made during the month was 6,071.

5. The cuttings made during April, 12,104, have all made roots, but for want of room they have been kept in the cutting beds. The total number of plants and partially rooted cuttings was, on the 31st May, 55,557.

NUMBER and Distribution of Chinchona Plants in the Government Plantation at Darjeeling, 1 June 1865.

N A M E OF SPECIES OF CHINCHONA.	Number in Permanent Plantation.	Number of Stock Plants for Propagation.	Number of Seedlings or Rooted Cuttings in Nursery Beds for Permanent Plantation.	Number of Rooted Cuttings in Cutting Beds.	Number of Cuttings made during the Month.	Total Number of Plants, Cuttings, and Seedlings.
<i>C. succirubra</i> - - - -	389	4,391	- none -	6,070	3,500	14,350
<i>C. Calisaya</i> - - - -	- none -	23	- -	38	- none -	61
<i>C. micrantha</i> - - - -	15	929	- -	610	450	2,004
<i>C. officinalis</i> , including varieties -	690	18,639	- -	12,600	2,121	34,050
<i>C. Pahudiana</i> - - - -	2,162	- none -	2,930	- none -	- none -	5,092
TOTAL - - -	3,256	23,982	2,930	19,318	6,071	55,557

— No. 12. —

From *T. Anderson*, Esq., M.D., Superintendent of the Botanic Gardens, to
S. C. Bayley, Esq., Junior Secretary to the Government of Bengal.

Sir,

20 September 1865.

I HAVE the honour to submit the annexed Report on the Cultivation of Chinchona at Darjeeling during the month of August 1865.

REPORT on the Cultivation of Chinchonæ at Darjeeling during August 1865.

THE growth of the plants continues to be satisfactory, and the increase by cuttings has been successfully carried on during the month. The total number of plants, and partially rooted cuttings of all species on the 1st September, was 92,038. The number of cuttings made during the month was 11,121.

2. The weather during the month of August has differed very little from that of June and July; there has been excessive rain, complete saturation of the atmosphere, accom-

panied by dense mist, and almost no sunshine, while an equable temperature has prevailed everywhere. Only on five days did no rain fall; the total fall of rain during the month at the fourth plantation was 41 inches, or 136·58 inches from the 1st of January.

The temperature at all the plantations has varied little from the temperature of the two previous months.

At the fourth plantation the mean maximum temperature was 85·54, the mean minimum 66·7, and the mean temperature 76·16.

At the fifth plantation nine observations of the minimum thermometer give a mean minimum temperature of 71·9.

3. During the month, the number of plants of *C. officinalis* at the first and second plantations has been increased to 100 plants at each plantation, making the total number of specimens permanently planted out 3,436.

4. The least and greatest growth of each species at the different plantations is given in this Table.

TABLE showing the Maximum and Minimum Growth of Species of Chinchonæ during August, at five different Plantations.

NAME OF SPECIES.	First Plantation, Maximum and Minimum Growth.	Second Plantation, Maximum and Minimum Growth.	Third Plantation, Maximum and Minimum Growth.	Fourth Plantation, Maximum and Minimum Growth.	Fifth Plantation Maximum and Minimum Growth.
	<i>Inches.</i>	<i>Inches.</i>	<i>Inches.</i>	<i>Inches.</i>	<i>Inches.</i>
<i>C. succirubra</i> - - -	- - -	- - -	2 to 3½	¾ to 5½	½ to 9½
<i>C. micrantha</i> - - -	- - -	- - -	¼ to 1½	4 to 12½	—
<i>C. officinalis</i> - - -	½ to 4	¼ to 2½	¼ to 4½	¼ to 6¾	¼ to 3¾
<i>C. Pahudiana</i> - - -	¼ to 2½	1 to 3¾	¼ to 4	3 to 9	3¾ to 11

5. I have lately been able to correct an error which occurred in determining the height above the sea of the fifth plantations. The altitude of these plantations was found by observations made by a boiling-point thermometer, whose readings had been compared with a standard at the Calcutta Observatory. A large bubble of air had evidently become entangled among the mercury in the bulb during the journey from Calcutta, thus completely deranging the instrument. The error in the thermometer was detected after determining the height of a place in the Teesta Valley, whose altitude had previously been found by a mercurial barometer, but it was then too late to repeat the observations at the Chinchona plantations with trustworthy instruments. During the present rainy season, I found time to make a series of observations at all the plantations with two mountain barometers by Newman, and also with a boiling-point thermometer. These instruments had all been compared with standards at Calcutta, and I tested them at Darjeeling, at a point whose height had been determined by Dr. Hooker.

The corrections I have made are as follows:

1st Plantation, supposed height 5,500 feet, true height 5,321
2d - ditto - - ditto - 4,350 - - ditto - 5,000
3d - ditto - - ditto - 3,715 - - ditto - 4,410
4th - ditto - - ditto - 2,500 - - ditto - 3,332
5th - ditto - - ditto - 1,825 - - ditto - 2,556

NUMBER and Distribution of Chinchona Plants at the Government Plantations at Darjeeling, on the 1st September 1865.

NAME OF SPECIES OF CHINCHONÆ.	Number in Permanent Plantation.	Number of Stock Plants for Propagation.	Number of Seedlings or Rooted Cuttings in Nursery Beds for Permanent Plantation.	Number of Rooted Cuttings in Cutting Beds.	Number of Cuttings made during the Month.	Total Number of Plants, Cuttings, and Seedlings.
<i>C. succirubra</i> - - -	389	10,000	- none -	18,095	5,530	34,014
<i>C. Calisaya</i> - - -	- none -	23	- -	74	11	108
<i>C. micrantha</i> - - -	15	2,539	- -	620	600	3,774
<i>C. officinalis</i> , including varieties	870	10,000	8,459	24,741	4,980	49,050
<i>C. Pahudiana</i> - - -	2,162	- none -	2,930	- none -	- none -	5,092
TOTAL - - -	3,436	22,562	11,389	43,530	11,121	92,038

— No. 13. —

From *T. Anderson, Esq., M.D.*, Superintendent of the Botanical Gardens, to
S. C. Bayley, Esq., Officiating Secretary to the Government of Bengal.

17 November 1865.

I HAVE the honour to submit the annexed Report on the Chinchona cultivation at Darjeeling during the month of September 1865.

REPORT of the Cultivation of Chinchonæ at Darjeeling during the month of
 September 1865.

I HAVE again to report the satisfactory advance of the propagation of all the species and the vigorous growth of the open air plants, especially of *C. succirubra* and *officinalis*. *C. micrantha* has as yet been tried in the open air only at the three lower plantations, and although the plants have grown luxuriantly, still they do not appear to be so healthy as those of the other species. No trustworthy experiments can be made with this species in the open air until a large stock of it has been obtained.

2. During September, 7,309 cuttings were made, thus raising the number of plants and partially-rooted cuttings on the 1st October to 99,347.

3. The weather during September was decidedly drier than usual; rain fell on only 13 days, while the remaining 17 days were bright and sunny. The amount of rain registered at the fourth plantation was 15 inches, making a total fall of 151·58 inches from the 1st January.

At the fourth plantation, the mean maximum temperature of the month was 84·65, the mean minimum 65·4, and the mean temperature 74·91. At the fifth plantation 10 observations of the minimum thermometer gave a mean minimum temperature of 69·4.

4. The greater amount of sunshine at the three upper plantations, where for the last three months the plants have been enveloped in dense mist, has caused an increase in the growth of all the species.

5. In an earlier report, I stated that the stock plants for propagation were planted in open air beds, where the plants, without any protection, were completely exposed to the air. The rate of growth of these plants, continually deprived, as they must be, of all the young shoots for cuttings, was found to be so slow, that the propagation, as soon as the rain ceased, would be nearly arrested. The cuttings from these open-air plants were also so slow in rooting, that even during the rainy season only one-fourth of the number of plants could be obtained, compared with the increase that the stock plants grown under glass would yield. I find that the only certain method of procuring a large annual increase is to keep all the stock plants (*i. e.*, plants from which the monthly crops of cuttings are obtained) in the confined air of low glazed frames, the plants being grown in prepared soil over which the frames are placed. When these stock plants have become thoroughly well established, each plant, during the rainy season, will yield two crops of cuttings in the month, with an average amount of two cuttings from each plant for each crop. From the 1st November until 1st April, only one cutting per plant can be expected during the month, or a fourth of the number produced during the rains. From this experience, gained during the rains, I determined, in August, to place 10,000 plants of each species under glass in the manner indicated above, and to cultivate these plants for cuttings only.

6. During September, 10,000 plants of *C. succirubra* were planted in frames, while frames and beds were prepared for an equal number of *C. officinalis*, and for all the plants I possessed of *C. micrantha* and *Calisaya*. The benefit of this change in the method of treating the stock plants will hardly appear before November, as it will take six weeks before the plants recover from the shock they have received by being transplanted.

TABLE showing the Maximum and Minimum Growth of Species of Chinchonæ during
 September, at five different altitudes.

NAME OF SPECIES.	First Plantation, Maximum and Minimum Growth.	Second Plantation, Maximum and Minimum Growth.	Third Plantation, Maximum and Minimum Growth.	Fourth Plantation, Maximum and Minimum Growth.	Fifth Plantation, Maximum and Minimum Growth.
	<i>Inches.</i>	<i>Inches.</i>	<i>Inches.</i>	<i>Inches.</i>	<i>Inches.</i>
<i>C. succirubra</i> - - -	- -	- -	1	$\frac{1}{4}$ to 11 $\frac{1}{2}$	3 to 18 $\frac{1}{2}$
<i>C. micrantha</i> - - -	- -	- -	6 $\frac{1}{2}$	11 $\frac{1}{2}$	- none.
<i>C. officinalis</i> - - -	$\frac{1}{2}$ to 4 $\frac{1}{2}$	1	$\frac{1}{4}$ to 3	3 $\frac{1}{2}$ to 19	$\frac{1}{2}$ to 2 $\frac{1}{2}$
<i>C. Pahudiana</i> - - -	$\frac{1}{2}$ to 6 $\frac{1}{2}$	$\frac{1}{2}$ to 6 $\frac{1}{2}$	2 to 8	1 $\frac{1}{2}$ to 6	$\frac{1}{2}$ to 5

NUMBER and Distribution of Chinchona Plants in the Government Plantation at Darjeeling, on the 1st October 1865.

NAME of SPECIES of CHINCHONÆ.	Number in Permanent Plantation.	Number of Stock Plants for Propagation.	Number of Seedlings or Rooted Cuttings in Nursery beds for Permanent Plantations.	Number of Rooted Cuttings in Cutting Beds.	Number of Cuttings made during the Month.	Total Number of Plants, Cuttings, and Seedlings.
C. succirubra - - -	389	10,000	- none -	23,625	5,020	39,034
C. Calisaya - - - -	- none -	23	- -	85	9	117
C. officinalis, including varieties	870	10,000	8,459	29,721	2,080	51,130
C. micrantha - - -	15	2,539	- -	1,220	200	3,974
C. Pahudiana - - -	2,162	- none -	2,930	- none -	- none -	5,092
TOTAL - - -	3,436	22,562	11,389	54,651	7,309	99,847

— No. 14. —

From Sir Charles Wood, to the Governor General of India in Council.

India Office,
London, 30 September 1865.

Sir,
Para 1. I HEREWITH transmit, for your Excellency's information, ten copies of the Report of Mr. Howard's analysis of specimens of chinchona bark forwarded from the Neilgherry hills last May. You will observe that, although this analysis shows that the Neilgherry barks are very rich in febrifuge alkaloids, yet that "the crystallizations of quinine are mixed with some sulphate of chinchonidine, which is commercially, but not medicinally, a disadvantage." At present quinine is the only product of the bark which has great commercial value; yet it is the opinion of the most eminent chemists, such as Mr. Howard and Dr. de Vry, who have made the analysis of bark their special study, that of the other chinchona alkaloids, chinchonidine and quinidine are very nearly as efficacious as quinine, and that chinchonine, though inferior to the other three, is by no means deficient in febrifuge qualities.

2. I consider it very important, as affecting the commercial interests of the chinchona experiment, that an authoritative medical decision should be pronounced on the relative value of the chinchona alkaloids, other than quinine, namely, chinchonidine, quinidine, and chinchonine. The best way of attaining this object would be to appoint a commission in each Presidency, with instructions to test the efficiency of these alkaloids on a scale sufficiently extensive to ensure decisive results. Such a commission should be composed of medical men, who have had long experience in the treatment of fevers, and whose report on a question of this nature would have weight with the medical profession generally. I desire that a commission for this purpose may be nominated, and in the meanwhile I shall give directions for a supply of the alkaloids in question to be carefully prepared at Mr. Howard's manufactory, and sent out in sufficient quantity to ensure a satisfactory trial of their efficacy. The conclusions arrived at by the commission should be embodied in a report.

I have, &c.
(signed) C. Wood.

— No. 15. —

From T. Anderson, Esq., M.D., Superintendent, Botanical Gardens, to S. C. Bayley, Esq., Junior Secretary to the Government of Bengal.

3 January 1866.

I HAVE the honour to transmit herewith the Report of the chinchona cultivation at Darjeeling for the month of October 1865.

REPORT of the Cultivation of Chinchonæ at Darjeeling during the Month of October 1865.

I AM glad to be able to report the continued success of the cultivation. The number of cuttings made during the month was 9,615, making a total number of plants and cuttings in all stages of growth, 108,962. The alterations in the mode of growing the plants from which cuttings are obtained has been completed for all the species. The full number of stock plants for cutting (10,000), has been attained in the case of *C. succirubra* and *C. officinalis*; but some months must elapse before the number of stock plants of *C. micrantha* is completed.

As I possess only 142 plants and cuttings of *C. Calisaya*, this valuable species must be cultivated under the shelter of glass for some years longer. During the month 14,500 well rooted plants of *C. succirubra* were planted in open air beds, from which they will be transferred in April next to the open ground.

2. The first public sale of chinchonæ took place on the 2d October. Three purchasers attended, who among them bought the 1,000 plants offered for sale at the upset price of four annas each; only *C. officinalis* was sold.

3. The temperature of the past month has been considerably lower than that of September, the greatest difference being in the mean minimum temperature from the clear cloudless nights favouring radiation.

4. The rainfall has also greatly diminished; only one and half-inch of rain were recorded during the month, making a total fall of 153.08 inches from the 1st January. The mean maximum temperature at the fourth plantation was 80.06. The mean minimum 59.19, and the mean temperature of the month 69.62.

5. At the fifth and lowest plantation nine observations of the minimum thermometer give a minimum temperature of 61.3.

6. This decrease in the temperature, accompanied by dryness of the atmosphere, has affected the growth of the plants. The period of rest is rapidly approaching when the plants will remain almost dormant.

TABLE showing the Maximum and Minimum Growth during October 1865.

NAME of SPECIES.	First Plantation, Maximum and Minimum Growth.	Second Plantation, Maximum and Minimum Growth.	Third Plantation, Maximum and Minimum Growth.	Fourth Plantation, Maximum and Minimum Growth.	Fifth Plantation, Maximum and Minimum Growth.
<i>C. succirubra</i> - - -	- - -	- - -	$\frac{1}{4}$ to 1 inch -	$\frac{1}{2}$ to 2 $\frac{1}{2}$ inches -	$\frac{1}{4}$ to 6 $\frac{1}{2}$ inches.
<i>C. micrantha</i> - - -	- - -	- - -	$\frac{1}{2}$ inch - -	1 inch - -	none.
<i>C. officinalis</i> - - -	$\frac{3}{4}$ to 1 $\frac{1}{2}$ inches	1' to 2 inches -	$\frac{1}{2}$ to 4 inches -	$\frac{1}{2}$ to 2 inches -	$\frac{1}{4}$ to 2 $\frac{1}{2}$ inches.
<i>C. Pahudiana</i> - - -	$\frac{1}{4}$ to 1 inch -	$\frac{1}{4}$ to 3 " -	$\frac{1}{4}$ to 2 " -	1 to 5 $\frac{1}{2}$ " -	1 to 3 $\frac{1}{2}$ " -

NUMBER and Distribution of Chinchona Plants in the Government Plantations at Darjeeling on the 1st November 1865.

NAME of SPECIES of CHINCHONÆ	Number in Permanent Plantations.	Number of Stock Plants for Propagation.	Number of Seedlings or Rooted Cuttings in Nursery Beds for Permanent Plantations.	Number of Rooted Cuttings in Cutting Beds.	Number of Cuttings made during the Month.	Total Number of Plants, Cuttings, and Seedlings.
<i>C. succirubra</i> - - -	389	10,000	14,500	14,145	4,100	43,134
<i>C. Calisaya</i> - - -	- - -	23	- - -	94	25	142
<i>C. micrantha</i> - - -	15	2,539	- - -	1,420	290	4,264
<i>C. officinalis</i> , including varieties	870	10,000	8,459	31,801	5,200	56,330
<i>C. Pahudiana</i> - - -	5,092	- - -	- - -	- - -	- - -	5,092
TOTAL - - -	6,366	22,562	22,959	47,460	9,615	108,962

— No. 16. —

From *T. Anderson*, Esq., M.D., Superintendent, Botanic Gardens, to the Junior Secretary to the Government of Bengal.

2 March 1866.

I HAVE the honour to transmit herewith the Report of the chinchona cultivation at Darjeeling for the month of November 1865.

REPORT of the Cultivation of Chinchonæ at Darjeeling during the Month of November 1865.

I HAVE little to report this month beyond the usual steady increase in the number of plants, and the continued good condition of the plants. The increasing cold, accompanied by great dryness, has reduced the rate of growth below that of last month. At the upper plantation growth has nearly ceased, but at the two lower plantations some of the plants have grown more than three inches during the month. The approach of the cold season has also affected the operations of artificial propagation by cuttings, only 8,280 cuttings having been made, which is 1,335 cuttings less than the number procured in October. The total number of plants and cuttings of all species is 117,242.

2. The weather during the month was cold and dry, with bright sunny days, until the 21st; after that date, during the nights and mornings, the sky was clear, but thick fogs prevailed during the day above the second plantation.

3. On the 25th a thunder-storm, accompanied by hail and rain, passed over Darjeeling; at Rungbee a little hail, followed by a few drops of rain, fell. The quantity was too small to be appreciable in the rain gauge.

4. At the fourth plantation, the mean maximum temperature was 77.63. The mean minimum 52.2, and the mean temperature of the month was 64.91.

TABLE showing the Maximum and Minimum Growth during November 1865.

NAME of SPECIES.	First Plantation.	Second Plantation.	Third Plantation.	Fourth Plantation.	Fifth Plantation.
<i>C. succirubra</i> - - -	- - -	- - -	$\frac{1}{4}$ inch - -	$\frac{1}{4}$ in. to 1 in. -	$\frac{1}{2}$ in. to $3\frac{1}{4}$ in.
<i>C. micrantha</i> - - -	- - -	- - -	- none - -	- none - -	- none.
<i>C. officinalis</i> - - -	$\frac{1}{2}$ inch - -	1 in. to $1\frac{1}{2}$ in.	$\frac{1}{2}$ in. to $1\frac{1}{2}$ in. -	$\frac{1}{4}$ in. to 2 in. -	$\frac{1}{4}$ in. to $1\frac{1}{2}$ in.
<i>C. Pahudiana</i> - - -	$\frac{1}{2}$ in. to $\frac{3}{4}$ in. -	$\frac{1}{2}$ in. to $1\frac{1}{4}$ in.	$\frac{1}{4}$ inch - -	$\frac{1}{4}$ in. to $2\frac{1}{4}$ in. -	2 in. to 3 in.

NUMBER and Distribution of Chinchona Plants in the Government Plantations at Rungbee, on the 1st December 1865.

NAME of SPECIES of CHINCHONÆ.	Number in Permanent Plantations.	Number of Stock Plants for Propagation.	Number of Seedlings or Rooted Cuttings in Nursery Beds for Permanent Plantations.	Number of Rooted Cuttings in Cutting Beds.	Number of Cuttings made during the Month.	Total Number of Plants, Cuttings, and Seedlings.
<i>C. succirubra</i> - - -	389	10,000	14,500	18,245	2,900	46,034
<i>C. Calisaya</i> - - -	- none -	26	- - -	116	- none -	142
<i>C. micrantha</i> - - -	15	2,539	- - -	1,710	280	4,544
<i>C. officinalis</i> , including varieties	870	10,000	8,459	37,001	5,100	61,430
<i>C. Pahudiana</i> - - -	5,092	- none -	- - -	- none -	- none -	5,092
TOTAL - - -	6,366	22,565	22,959	57,072	8,280	117,242

— No. 17. —

From *Thomas Anderson, Esq., M.D.*, Superintendent, Botanical Gardens, and in charge of Chinchona Cultivation in Bengal, to the Junior Secretary to the Government of Bengal.

17 March 1866.

I HAVE the honour to forward the Report on the cultivation of Chinchonæ at Darjeeling, for the month of December 1865.

REPORT of the Cultivation of Chinchonæ at Darjeeling, during the Month of December 1865.

THE great cold of this month has affected all the operations of the cultivation, as well as the growth of the plants in the open air. Only 3,610 cuttings were made during the month. The plants grown under glass have yielded a considerable number of cuttings; the largest number has been obtained from *C. officinalis* and its varieties. In all the plantations, except the lowest, growth has ceased, and the plants are in a state of complete rest. At the lowest plantation the plants have continued to grow during December, as the air of this plantation is moist and warm from the situation between two deep gorges in which the streams Runjo and Rungbee flow.

2. During this month a small plantation of *C. succirubra* has been formed in the Teesta valley, in an open sâl forest, at an elevation of 1,000 feet above the sea. The temperature and amount of moisture in this sâl forest are very different from the conditions at Rungbee, and the growth of the plants in the new site will be watched with great interest. No care, of course, can be taken of them beyond surrounding the plantation with a fence, and keeping the plants tolerably free from weeds. The site of the plantation was first cleared from trees and undergrowth, so that the plants are fully exposed to sun-light. Some months must elapse before any opinion can be formed of the state of the plants in this plantation. If they succeed, the cultivation of *C. succirubra* may afterwards be extended to the dry sâl forest of the Terai.

3. The weather, during December, has been cold, cloudy, and misty at the upper plantations; and, from the fourth plantation downwards, the air has been dry, with a clear sky, warm sunshine, and great nocturnal radiation.

4. On the 26th, one-tenth of an inch of rain fell, making the total rain-fall, from the 1st January to 31st December 1865, at the fourth plantation, 3,332 feet above the sea, 153·18 inches.

5. At the fourth plantation the mean maximum temperature was 63·67. The mean minimum 46·87, and the mean temperature 55·27. These figures show a decrease in the temperature since last month. At the first plantation the highest temperature observed during the month was 61°, and the lowest 35°, on the morning of the 29th December.

TABLE showing the Maximum and Minimum Growth during December 1865.

NAME of SPECIES.	First Plantation.	Second Plantation.	Third Plantation.	Fourth Plantation.	Fifth Plantation.
<i>C. succirubra</i> - - -	- - -	- - -	- none - -	$\frac{1}{4}$ in. to $\frac{3}{4}$ in. -	$\frac{1}{4}$ in. to $1\frac{1}{4}$ in.
<i>C. micrantha</i> - - -	- - -	- - -	- none - -	- none - -	- none.
<i>C. officinalis</i> - - -	- none -	$\frac{1}{2}$ inch -	$\frac{1}{2}$ in. to 3 in. -	$\frac{1}{4}$ inch -	$\frac{1}{4}$ in. to $2\frac{1}{2}$ in.
<i>C. Pahudiana</i> - - -	- none -	- none -	$\frac{1}{4}$ inch -	$\frac{1}{4}$ inch -	$\frac{1}{4}$ in. to 1 in.

NUMBER and Distribution of Chinchona Plants in the Government Plantations at Rungbee, on the 1st January 1866.

NAME of SPECIES of CHINCHONÆ.	Number in Permanent Plantations.	Number of Stock Plants for Propagation.	Number of Seedlings or Rooted Cuttings in Nursery Beds for Permanent Plantations.	Number of Rooted Cuttings in Cutting Beds.	Number of Cuttings made during the Month.	Total Number of Plants, Cuttings, and Seedlings.
<i>C. succirubra</i> - - -	489	10,000	14,400	21,145	1,500	47,534
<i>C. Calisaya</i> - - -	- none -	26	- - -	116	- none -	142
<i>C. micrantha</i> - - -	15	2,539	- - -	1,990	210	4,754
<i>C. officinalis</i> , including varieties	870	10,000	8,459	42,101	1,900	63,330
<i>C. Pahudiana</i> - - -	5,092	- none -	- none -	- none -	- none -	5,092
TOTAL - - -	6,466	22,565	22,859	65,352	3,610	120,852

— No. 18. —

From Messrs. *Mair & Co.* to the Secretary of State for India.

6, Lime-street, London. E.C.,

9 August 1864.

Sir,

HAVING in our care extensive tracts of land in Darjeeling, chiefly under tea cultivation for several companies, among which are the Lebong and Himalaya, with London Boards; and knowing your desire to promote the interests of India, we beg to inform you that we are sending out a trained Scotch gardener by the steamer of the 20th instant, who will find forcing-houses and the requirements necessary for the cultivation of chinchona ready for him. We are advised by the head of our firm, who is now at Darjeeling, that it is the intention of the Government to sell its chinchona plants some time hence, when, doubtless, we shall be extensive buyers; but, in the meantime, we should esteem it a favour if you would direct Dr. Anderson to give to Messrs. *Mair & Co.* a few plants, even if it were only two or three of each variety, that our gardener might commence the cultivation of them on his arrival there.

Hoping that we have not made an unreasonable request, and begging that you will excuse the liberty we take in writing to you, which we do with the knowledge that you alone can assist us in this important matter,

We are, &c.

(signed) for *David K. Mair & Co.*,
J. H. Norman.

— No. 19. —

From Mr. *Merivale* to Messrs. *Mair & Co.*

Sir,

India Office, 18 August 1864.

I AM directed by Sir Charles Wood to acknowledge the receipt of your letter, dated the 9th instant, requesting that your gardener may be supplied with a few chinchona plants on his arrival at Darjeeling.

2. Sir Charles Wood is extremely desirous to see the cultivation of chinchona plants undertaken by private enterprise, and he has recently expressed his views on this point to the Government of India, to whom, or to the Government of Bengal, application should be made to ascertain whether any plants are available for sale at Darjeeling.

3. The plantations on the Neilgherry Hills are on a much larger scale, and 31,662 plants have already been distributed to private individuals. You can purchase plants from these plantations in sufficient numbers to commence their cultivation on a moderate scale, by applying to Mr. William G. McIvor, the Government Superintendent.

I am, &c.

(signed) *Herman Merivale.*

— No. 20. —

From *T. Anderson*, Esq., M.D., Superintendent, Botanical Gardens, and in charge of Chinchona Cultivation in Bengal, to the Officiating Junior Secretary to the Government of Bengal.

6 April 1866.

I HAVE the honour to forward the Report on the cultivation of Chinchonæ at Darjeeling, for the month of January 1866.

REPORT of the Cultivation of Chinchonæ at Darjeeling, during the Month of January 1866.

JANUARY is always the coldest month at Darjeeling, and accordingly vegetation is completely arrested until the return of spring, about the middle of February. I have, therefore, little progress to report this month. No cuttings of *C. succirubra* were made; and only 1,100 of *C. officinalis* were obtained during January. The valuable species *C. Calisaya*, however, yielded 12 cuttings, making 1,112 cuttings of all species as the increase made during this month. The total number of plants planted out permanently in the open air has been increased to 6,598 by the formation of three small plantations in the Teesta valley. The young plants of *C. succirubra* in open unprotected beds for the formation in April of bark yielding plantations, have been increased this month to 16,783. The total number of plants and cuttings of all species of Chinchona on the 31st January was 138,008.

2. A quantity of seed of *C. officinalis* yielded by plants grown at the Chinchona plantations in Ceylon has been sent to me by Mr. Thwaites, the Director of the Ceylon Botanical Gardens. The seed has been sown at the distribution nursery at Rungyroong.

3. Eighty-eight plants of Chinchona were distributed during the month.

4. The repairing of the road through the plantations (about five miles in length) was completed during the month. A bridge across the Rungbee stream has been commenced in order to admit of the plantations now being opened up at Rishap being visited during the rains, when the Rungbee is impassable. The site of the permanent plantations at Rishap has been cleared of jungle, and the stumps have been rooted out over an extent of nearly three acres.

5. The weather during January has much resembled what prevailed during December, only that the temperature has been lower, and a small quantity of rain has fallen. 2·2 inches of rain were recorded at Rungbee during this month. At the second plantation, 5,000 feet above the sea, the mean maximum temperature was 54·6, the mean minimum 37·4, and the monthly mean temperature 46. At the fourth plantation, the mean maximum temperature was 59·4, the mean minimum 48·4, and the mean temperature 53·9. At the fifth plantation, 2,556 feet above the sea, 16 observations give the following results:—The mean maximum temperature was 65·5, the mean minimum 47·5, and the mean temperature 56·5. At the first plantation, the self-registering thermometer was observed on six distinct days. The highest temperature observed was 56 degrees, and the lowest 34 degrees.

TABLE showing the Maximum and Minimum Growth during January 1866.

NAME of SPECIES.	First Plantation.	Second Plantation.	Third Plantation.	Fourth Plantation.	Fifth Plantation.
<i>C. succirubra</i> - - -	- - -	- - -	- none -	$\frac{1}{4}$ in. to $\frac{1}{2}$ in. -	$\frac{1}{2}$ in. to 2 in.
<i>C. micrantha</i> - - -	- - -	- - -	- none -	- none -	- none.
<i>C. officinalis</i> - - -	- none -	- none -	$\frac{1}{4}$ in. to $1\frac{1}{2}$ in.	- none -	$\frac{1}{2}$ in. to $1\frac{1}{2}$.
<i>C. Pahudiana</i> - - -	$\frac{1}{4}$ inch -	$\frac{1}{4}$ inch -	$\frac{1}{4}$ inch -	$2\frac{1}{2}$ inches -	$\frac{1}{4}$ in. to 1 in.

NUMBER and Distribution of the Chinchona Plants in the Government Plantations at Rungbee, on the 1st February 1866.

NAME of SPECIES of CHINCHONÆ.	Number in Permanent Plantations.	Number of Stock Plants for Propagation.	Number of Seedlings or Rooted Cuttings in Nursery Beds for Permanent Plantations.	Number of Rooted Cuttings in Cutting Beds.	Number of Cuttings made during the Month.	Total Number of Plants, Cuttings, and Seedlings.
<i>C. succirubra</i> - - -	606	10,000	16,783	37,145	- none -	64,534
<i>C. Calisaya</i> - - - -	- none -	26	- none -	119	12	157
<i>C. micrantha</i> - - -	30	2,539	- none -	2,185	- none -	4,754
<i>C. officinalis</i> , including varieties	870	10,000	7,500	44,001	1,100	63,471
<i>C. Pahudiana</i> - - -	5,092	- none -	- none -	- none -	- none -	5,092
TOTAL - - -	6,598	22,565	24,283	83,450	1,112	138,008

— No. 21. —

From *T. Anderson*, Esq., M.D., Superintendent, Botanical Gardens, and in charge of Chinchona Cultivation in Bengal, to the Officiating Junior Secretary to the Government of Bengal.

13 April 1866.

I HAVE the honour to forward the Report on the cultivation of Chinchonæ at Darjeeling, for the month of February 1866.

REPORT of the Cultivation of Chinchonæ at Darjeeling, during the Month of February 1866.

THE progress of the cultivation of Chinchonæ at Darjeeling continues to be satisfactory. Eight thousand and nine hundred (8,900) cuttings were made in February, and several thousands seeds of *C. officinalis* received from Ceylon germinated. These seedlings are too small yet to be included in the number of plants in the nurseries. The total number of plants and cuttings on the 1st March was 146,908. The distribution of these in the open air and nursery beds remains the same as last month.

2. During the month, 780 plants of Chinchonæ were distributed; the applicants receiving them were Dr. Jameson, Botanical Gardens, North-Western Provinces, Saharunpore; Scottish Assam Tea Company, and Dr. Fraser, Her Majesty's 88th Regiment, for a Chinchona plantation at Kangra.

3. The weather during February was unusually inclement, the cold having been greater than in January. About the middle of the month a snow-storm occurred over a great part of the Himalaya; at Darjeeling it was accompanied by severe frost. The fall of snow did not extend even to the upper plantations, but much hail followed by rain fell at the upper plantations, and on the 13th the thermometer at Plantation No. 1 stood at 30 degrees. The amount of rain during the month was 3·5 inches.

TABLE showing the Temperature of the Month at the different Plantations.

Plantations.	Mean Maximum.	Mean Minimum.	Mean.
1st Plantation - - -	51·5	35·3	43·4
2nd ditto - - -	56·3	36·7	46·5
3rd ditto - - -	62·3	41·7	52·
4th ditto - - -	61·6	49·2	55·4
5th ditto - - -	67·7	48·1	57·9

4. Growth commenced at the two lower plantations about the 20th of the month, but up to the end of the month no signs of the return of spring were noticed above 4,000 feet.

TABLE showing the Maximum and Minimum Growth during February 1866.

NAME of SPECIES.	First Plantation.	Second Plantation.	Third Plantation.	Fourth Plantation.	Fifth Plantation.
<i>C. succirubra</i> - - -	none	none	none	$\frac{1}{4}$ in. to 1 in.	$\frac{1}{4}$ in. to $3\frac{1}{2}$ in.
<i>C. micrantha</i> - - -	none	none	none	none	none.
<i>C. officinalis</i> - - -	none	$\frac{1}{2}$ inch	$\frac{1}{4}$ in. to $\frac{3}{4}$ in.	$\frac{1}{4}$ in. to $1\frac{3}{4}$ in.	$\frac{1}{4}$ in. to $1\frac{3}{4}$ in.
<i>C. Pahudiana</i> - - -	none	$\frac{1}{4}$ inch	none	$\frac{1}{4}$ in. to $1\frac{1}{4}$ in.	$1\frac{1}{4}$ in. to $2\frac{3}{4}$ in.

NUMBER and Distribution of the Chinchona Plants in the Government Plantations at Rungbee, on the 1st March 1866.

NAME of SPECIES of CHINCHONÆ.	Number in Permanent Plantations.	Number of Stock Plants for Propagation.	Number of Seedlings or Rooted Cuttings in Nursery Beds for Permanent Plantations.	Number of Rooted Cuttings in Cutting Beds.	Number of Cuttings made during the Month.	Total Number of Plants, Cuttings, and Seedlings.
<i>C. succirubra</i> - - -	606	10,000	16,783	37,145	2,000	66,534
<i>C. Calisaya</i> - - -	none	26	none	131	none	157
<i>C. micrantha</i> - - -	30	2,539	none	2,185	400	5,154
<i>C. officinalis</i> , including varieties	870	10,000	7,500	45,101	6,500	69,971
<i>C. Pahudiana</i> - - -	5,092	none	none	none	none	5,092
TOTAL - - -	6,598	22,565	24,283	84,562	8,900	146,908

— No. 22. —

From *T. Anderson*, Esq., M.D., Superintendent, Botanical Gardens, and in charge of Chinchona Cultivation in Bengal, to the Officiating Junior Secretary to the Government of Bengal.

1 May 1866.

I HAVE the honour to forward the Report on the cultivation of Chinchonæ at Darjeeling, for the month of March 1866.

REPORT of the Cultivation of Chinchonæ at Darjeeling, during the Month of March 1866.

I HAVE to report the continued success of the experiment. The return of warm weather has forwarded all the operations of the cultivation, besides increasing the amount of growth of the plants permanently planted out. The increase by cuttings and seedlings has raised the number of plants in all stages of growth to 178,741. These figures include the 10,781 plants in the distribution nursery at Rungyroong, which have hitherto not appeared in the monthly return. Sixteen thousand eight hundred and ninety-five (16,895) cuttings were made during the month; this is the largest number that has been obtained in one month since the commencement of the experiment at Darjeeling. Three thousand and one hundred (3,100) seedlings of *C. officinalis* having attained a considerable size, have been added during the month to the plants kept for permanent plantations. More seeds are germinating daily, and I have received another packet of seed of *C. officinalis* collected from the plants that have flowered in the Chinchona plantations in Ceylon. There are now 89,821 plants and cuttings of this valuable species in the Darjeeling nurseries.

2. Two hundred and ninety (290) plants were distributed during the month.

3. The weather during March was clear and windy, and very dry. No rain fell during the month, and very little dew occurred during the nights, in consequence of the continued strong winds. The days were generally hot and sunny, while the temperature at night often fell 25 degrees below that of the day. Such weather is not favourable to vegetation of any kind, and accordingly the growth of the Chinchonas during March was not nearly so great as it would have been, had any rain fallen during the month.

TABLE showing the Temperature of the Month at the different Plantations.

Plantations.	Mean Maximum.	Mean Minimum.	Mean.
1st Plantation - - -	67·5	47·3	57·4
2nd ditto - - -	70·2	49·6	59·9
3rd ditto - - -	77·	55·8	66·4
4th ditto - - -	75·2	60·6	67·9
5th ditto - - -	82·9	59·3	71·1

TABLE showing the Maximum and Minimum Growth during March 1866.

NAME of SPECIES.	First Plantation.	Second Plantation.	Third Plantation.	Fourth Plantation.	Fifth Plantation.
C. succirubra - - -	- none -	- none -	- none -	½ to 1 inch	¾ to 8½ inches.
C. micrantha - - -	- - -	- none -	- none -	- none -	- none.
C. officinalis - - -	½ inch -	1 to 3 inches -	¾ to 2¾ inches	½ to 3¼ inches	½ to 7½ inches.
C. Pahudiana - - -	- none -	¾ inch -	2 inches -	1 to 3 „	1 to 5 inches.

NUMBER and Distribution of the Chinchona Plants in the Government Plantations at Rungbee, on the 1st April 1866.

NAME of SPECIES of CHINCHONÆ.	Number in Permanent Plantations.	Number of Stock Plants for Propagation.	Number of Seedlings or Rooted Cuttings in Nursery Beds for Permanent Plantations.	Number of Rooted Cuttings in Cutting Beds.	Number of Cuttings made during the Month.	Total Number of Plants, Cuttings, and Seedlings.
C. succirubra - - -	606	10,000	23,000	39,581	4,909	78,096
C. Calisaya - - -	- none -	26	- none -	131	20	177
C. micrantha - - -	30	2,539	- none -	2,650	336	5,555
C. officinalis, including varieties	870	10,000	14,100	53,221	11,630	89,821
C. Pahudiana - - -	5,092	- none -	- none -	- none -	- none -	5,092
TOTAL - - -	6,598	22,565	37,100	95,583	16,895	178,741

NAMES.	First Plantation, Altitude 5,321 feet.						Second Plantation, Altitude 5,000 feet.						Third Plantation, Altitude 4,410 feet.						Fourth Plantation, Altitude 3,332 feet.						Fifth Plantation, Altitude 2,556 feet.										
	Number.	Date of Planting.	Height in Inches when Planted.	Height on 1st March.	Height on 1st April.	Growth during March.	Date of Planting.	Height in Inches when Planted.	Height on 1st March.	Height on 1st April.	Growth during March.	Date of Planting.	Height in Inches when Planted.	Height on 1st March.	Height on 1st April.	Growth during March.	Date of Planting.	Height in Inches when Planted.	Height on 1st March.	Height on 1st April.	Growth during March.	Date of Planting.	Height in Inches when Planted.	Height on 1st March.	Height on 1st April.	Growth during March.	Date of Planting.	Height in Inches when Planted.	Height on 1st March.	Height on 1st April.	Growth during March.				
C. succirubra	1	-	-	-	-	-	29 June	18½	29	23½	4½	29 July	-	5	19	17½	2½	29 July	-	6	52½	55½	3	29 July	-	10½	55½	2½	29 July	-	6	52½	55½	3	
Ditto	2	-	-	-	-	-	29 "	17½	23½	25½	2	29 "	-	7½	31½	31½	1	29 "	-	5½	33½	36½	3	15 Oct.	-	17½	33½	16	29 "	-	5½	33½	36½	3	
Ditto	3	-	-	-	-	-	29 "	16	12	12½	6½	15 Oct.	-	10½	18	20½	12½	29 "	-	3	27½	30½	3	29 "	-	3	27½	30½	3	29 "	-	3	27½	30½	3
Ditto	4	-	-	-	-	-	29 "	6	22	22	6	29 "	-	4½	19	19	4	29 "	-	5½	46½	49½	3	29 "	-	5½	46½	49½	3	29 "	-	5½	46½	49½	3
Ditto	5	-	-	-	-	-	29 "	6	-	-	-	29 "	-	4½	33	33	4	29 "	-	3	46½	49½	3	29 "	-	3	46½	49½	3	29 "	-	3	46½	49½	3
Ditto	6	-	-	-	-	-	-	-	-	-	-	29 "	-	2	10½	10½	7½	29 "	-	4	42	42	4	29 "	-	4	42	42	4	29 "	-	4	42	42	4
Ditto	7	-	-	-	-	-	-	-	-	-	-	29 "	-	8	29½	30½	10	29 "	-	3	40½	43	3	29 "	-	3	40½	43	3	29 "	-	3	40½	43	3
Ditto	8	-	-	-	-	-	-	-	-	-	-	29 "	-	-	-	-	-	29 "	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Ditto	9	-	-	-	-	-	-	-	-	-	-	29 "	-	-	-	-	-	29 "	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Ditto	10	-	-	-	-	-	-	-	-	-	-	29 "	-	-	-	-	-	29 "	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
C. micrantha	1	-	-	-	-	-	29 July	5	8½	23	14½	15 Oct.	-	9	17½	17½	8	15 Oct.	-	5½	36	36	5	29 "	-	5½	36	36	5	29 "	-	5½	36	36	5
Ditto	2	-	-	-	-	-	29 "	7½	23	25½	2	15 "	-	6½	40	40	14	15 "	-	6	32	32	6	15 Oct.	-	6	32	32	6	15 Oct.	-	6	32	32	6
Ditto	3	-	-	-	-	-	29 "	6	10½	10½	4½	29 July	-	8	32	32	7½	29 July	-	4½	64	64	4	15 Oct.	-	4½	64	64	4	15 Oct.	-	4½	64	64	4
Ditto	4	-	-	-	-	-	29 "	5	8½	8	2½	29 "	-	3	45	45	7½	29 "	-	5½	11	11	5½	29 July	-	5½	11	11	5½	29 July	-	5½	11	11	5½
Ditto	5	-	-	-	-	-	25 "	-	-	-	-	29 "	-	-	-	-	-	29 "	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
C. officinalis	1	15 Dec.	-	8½	12½	4	4 "	8½	22½	22½	4	15 Oct.	-	4	42½	46	4	15 Oct.	-	4	13½	17½	4	15 "	-	5	13½	17½	4	15 "	-	5	13½	17½	4
Ditto	2	15 "	-	7½	14	7	15 "	11½	15	19	4	15 "	-	5½	35	36	4	15 "	-	5½	35½	36½	1	15 "	-	5½	35½	36½	1	15 "	-	5½	35½	36½	1
Ditto	3	15 "	-	6½	14	7	15 "	5	13	15	2	15 "	-	4½	28	28	4	15 "	-	4½	28	28	1	15 "	-	4½	28	28	1	15 "	-	4½	28	28	1
Ditto	4	15 "	-	6½	9½	3	15 "	5	13	15	2	15 "	-	5	49½	49½	4	15 "	-	5	49½	49½	1	15 "	-	5	49½	49½	1	15 "	-	5	49½	49½	1
Ditto	5	15 "	-	5½	13	7	15 "	5	16	17	1	15 "	-	5	41½	41½	4	15 "	-	5	41½	41½	1	15 "	-	5	41½	41½	1	15 "	-	5	41½	41½	1
Ditto	6	15 "	-	5½	13	7	15 "	6½	13	10½	3	15 "	-	5½	23	23	6	15 "	-	5½	23	23	1	15 "	-	5½	23	23	1	15 "	-	5½	23	23	1
Ditto	7	15 "	-	5	13½	8	15 "	6	19	19½	4	15 "	-	4	30½	31	5	15 "	-	4	18½	18½	1	15 "	-	5	18½	18½	1	15 "	-	5	18½	18½	1
Ditto	8	15 "	-	4	15	8	15 "	7	22½	23½	1	15 "	-	6	34	34	2	15 "	-	4½	17½	17½	1	15 "	-	4½	17½	17½	1	15 "	-	4½	17½	17½	1
Ditto	9	15 "	-	4½	12	12	15 "	7	22½	23½	1	15 "	-	6	34	34	2	15 "	-	4	14½	14½	1	15 "	-	4	14½	14½	1	15 "	-	4	14½	14½	1
Ditto	10	15 "	-	10	15½	16	15 "	7½	16	8	1	15 "	-	6½	34	34	1	15 "	-	3	16½	16½	3½	15 "	-	4	16½	16½	3½	15 "	-	4	16½	16½	3½
C. Pahudiana	1	15 "	-	5	13	13	15 "	5	14	14	-	15 "	-	5	39	39	-	15 "	-	7½	9½	9½	1	15 "	-	7½	9½	9½	1	15 "	-	7½	9½	9½	1
Ditto	2	28 Mar.	-	5	7½	7½	15 "	4	5	5	-	15 "	-	5½	32½	33	40	15 "	-	4½	32½	33	1½	29 July	-	1½	32½	33	1½	29 July	-	1½	32½	33	1½
Ditto	3	15 Dec.	-	2½	10	10	15 "	5	18½	18½	-	15 "	-	2	32	32	34	29 "	-	3	32	32	2	29 "	-	2	32	32	2	29 "	-	2	32	32	2
Ditto	4	15 "	-	2½	8½	8½	15 "	5	9	9	-	15 "	-	3	48½	48½	48	29 "	-	3	48½	48½	2	29 "	-	2½	48½	48½	2	29 "	-	2½	48½	48½	2
Ditto	5	15 "	-	2½	12½	12½	15 "	5½	24½	25	4	15 "	-	3	38	38	38	29 "	-	3	38	38	2	29 "	-	2½	38	38	2	29 "	-	2½	38	38	2
Ditto	6	15 "	-	2½	12½	12½	15 "	4	9½	9½	4	15 "	-	3	25½	25½	25½	29 "	-	3	25½	25½	1	29 "	-	2	25½	25½	1	29 "	-	2	25½	25½	1
Ditto	7	28 Mar.	-	3½	12½	12½	15 "	5	16½	16½	-	15 "	-	3	31½	31½	31½	29 "	-	3	31½	31½	1½	29 "	-	2½	31½	31½	1½	29 "	-	2½	31½	31½	1½
Ditto	8	15 Dec.	-	2½	13	13	15 "	5½	16½	16½	-	15 "	-	3	36	36	36	29 "	-	3	36	36	1	29 "	-	2½	36	36	1	29 "	-	2½	36	36	1
Ditto	9	15 "	-	2½	8	8	15 "	2½	13½	13½	-	15 "	-	3	28	28	31	29 "	-	3	28	28	3	29 "	-	4	28	28	3	29 "	-	4	28	28	3
Ditto	10	15 "	-	2½	11½	11½	15 "	3	9½	9½	-	15 "	-	3	28	28	31	29 "	-	3	28	28	3	29 "	-	4	28	28	3	29 "	-	4	28	28	3

Darjeeling,
1 April 1866.T. Anderson, M.D.,
Superintendent, Botanical Gardens, and in Charge of Chinchona Cultivation in Bengal.

— No. 23. —

From *T. Anderson*, Esq., M.D., Superintendent, Botanical Gardens, and in charge of Chinchona Cultivation in Bengal, to the Officiating Junior Secretary to the Government of Bengal.

23 May 1866.

I HAVE the honour to forward the Report on the cultivation of Chinchonæ at Darjeeling, for the month of April 1866.

REPORT of the Cultivation of Chinchonæ at Darjeeling for the Month of April 1866.

THE number of all species has been increased to 192,765 by the addition of 14,024 cuttings to the total number of last month. Fourteen thousand pits have been prepared for the permanent planting of *C. succirubra*, and the putting out of the plants in them had been commenced towards the end of the month. At plantation No. 4, 2,000 pits have been made for plants of *C. officinalis*, and planting was begun.

The seeds of *C. officinalis* received from Ceylon are growing rapidly; those sown in February were two inches in height in April, and the seeds sown in April germinated on the 11th day after sowing.

The weather during the month has been dry and hot; no rain fell between the 3rd and the 22nd, and only 3·7 inches were recorded as the total amount of rain during the month.

The temperature at the different plantations has altered very slightly from the record of March; nights were clear and cold, and in consequence the minimum temperature has been a little lower than in March. The days have been warmer than in March, and thus the mean temperature has been nearly the same as in that month.

The most important event that has occurred has been the flowering of two plants of *C. officinalis* at the Fourth Plantation. The plants have been 18 months in the ground, having been planted on the 15th October 1864; they were about four feet in height when the panicles of flowers first appeared. These are the first Chinchonas that have flowered in this part of India, and their production of flowers is a further proof that the climate of Sikhim is adapted to the growth of Chinchona.

TABLE showing the Temperature of the Month at the different Plantations.

Plantations.	Mean Maximum.	Mean Minimum.	Mean.
1st Plantation - - - -	68·50	46·50	57·50
2nd Ditto - - - -	70·90	49·40	60·15
3rd Ditto - - - -	79·24	52·92	66·08
4th Ditto - - - -	Record lost.		—
5th Ditto - - - -	84·90	58·00	71·45

TABLE showing the Maximum and Minimum Growth during April 1866.

NAME of SPECIES.	First Plantation.	Second Plantation.	Third Plantation.	Fourth Plantation.	Fifth Plantation.
<i>C. succirubra</i> - - -	- none -	- none -	- none -	2½ in. -	¼ in. to 4½ in.
<i>C. micrantha</i> - - -	- none -	- none -	- none -	- none -	1½ in.
<i>C. officinalis</i> - - -	¼ inch -	2½ inches -	3½ in. to 4½ in.	½ in. to 2½ in.	1 in. to 9½ in.
<i>C. Pahudiana</i> - - -	- none -	¼ in. to 1 in. -	¼ in. -	¼ in. to 1 in. -	4½ in. to 8½ in.

NUMBER and Distribution of the Chinchona Plants in the Government Plantations at Rungbee on the 1st May 1866.

NAME of SPECIES of CHINCHONÆ.	Number in Permanent Plantations	Number of Stock Plants for Propagation.	Number of Seedlings or Rooted Cuttings in Nursery Beds for Permanent Plantations.	Number of Rooted Cuttings in Cutting Beds.	Number of Cuttings made during the Month.	Total Number of Plants, Cuttings, and Seedlings.
<i>C. succirubra</i> - - -	606	10,000	27,000	40,490	4,600	82,696
<i>C. Calisaya</i> - - -	- none -	26	- none -	151	24	201
<i>C. micrantha</i> - - -	30	2,539	- none -	2,986	550	6,105
<i>C. officinalis</i> , including varieties	870	10,000	25,100	53,851	8,850	98,671
<i>C. Pahudiana</i> - - -	5,092	- none -	- none -	- none -	- none -	5,092
TOTAL - - -	6,598	22,565	52,100	97,478	14,024	192,765

TABLE showing the Growth of Clinchonas at the Rungbee Plantations during the Month of April 1866.

NAMES.	First Plantation, Altitude 5,321 feet.						Second Plantation, Altitude 5,000 feet.						Third Plantation, Altitude 4,410 feet.						Fourth Plantation, Altitude 3,332 feet.						Fifth Plantation, Altitude 2,556 feet.									
	Number.	Date of Planting.	Height in Inches when Planted.	Height on 1st April.	Height on 1st May.	Growth during April.	Date of Planting.	Height in Inches when Planted.	Height on 1st April.	Height on 1st May.	Growth during April.	Date of Planting.	Height in Inches when Planted.	Height on 1st April.	Height on 1st May.	Growth during April.	Date of Planting.	Height in Inches when Planted.	Height on 1st April.	Height on 1st May.	Growth during April.	Date of Planting.	Height in Inches when Planted.	Height on 1st April.	Height on 1st May.	Growth during April.	Date of Planting.	Height in Inches when Planted.	Height on 1st April.	Height on 1st May.	Growth during April.			
C. succirubra	1	-	-	-	-	-	29 June	18 1/2	29	29	-	29 July	5	19 1/2	22	2 1/2	29 July	-	5	19 1/2	22	2 1/2	29 July	-	5	19 1/2	22	2 1/2	29 July	-	5	19 1/2	22	2 1/2
Ditto	2	-	-	-	-	-	29 "	17 3/4	23 1/2	23 1/2	-	29 "	6	17 3/4	17 1/2	-	29 "	-	6	17 3/4	17 1/2	-	29 "	-	6	17 3/4	17 1/2	15 Oct.	-	6	17 3/4	17 1/2	-	
Ditto	3	-	-	-	-	-	29 "	16	26 1/2	25 1/2	-	29 "	7 1/2	26 1/2	31 1/2	-	29 "	-	7 1/2	31 1/2	31 1/2	-	29 "	-	7 1/2	31 1/2	15 Oct.	-	7 1/2	31 1/2	31 1/2	-		
Ditto	4	-	-	-	-	-	29 July	6	12 1/2	12 1/2	-	29 July	6	12 1/2	18	-	29 "	-	10 1/2	18	18	-	29 "	-	10 1/2	18	29 "	-	10 1/2	18	29 "	-		
Ditto	5	-	-	-	-	-	29 "	-	22	22	-	29 "	-	22	20 1/2	-	29 "	-	22	20 1/2	20 1/2	-	29 "	-	22	20 1/2	29 "	-	22	20 1/2	20 1/2	-		
Ditto	6	-	-	-	-	-	-	-	-	-	-	-	-	-	19	-	-	-	4 1/2	19	19	-	-	-	4 1/2	19	29 "	-	4 1/2	19	46 1/2	51		
Ditto	7	-	-	-	-	-	-	-	-	-	-	-	-	-	33	-	-	-	33	33	33	-	-	-	33	33	29 "	-	33	33	46 1/2	51		
Ditto	8	-	-	-	-	-	-	-	-	-	-	-	-	-	10 1/2	-	-	-	10 1/2	10 1/2	10 1/2	-	-	-	10 1/2	10 1/2	29 "	-	10 1/2	10 1/2	47	47		
Ditto	9	-	-	-	-	-	-	-	-	-	-	-	-	-	30 1/2	-	-	-	30 1/2	30 1/2	30 1/2	-	-	-	30 1/2	30 1/2	29 "	-	30 1/2	30 1/2	44	44		
Ditto	10	-	-	-	-	-	-	-	-	-	-	-	-	-	40 1/2	-	-	-	40 1/2	40 1/2	40 1/2	-	-	-	40 1/2	40 1/2	29 "	-	40 1/2	40 1/2	30	30		
C. micrantha	1	-	-	-	-	-	29 July	5	8 1/2	8 1/2	-	15 Oct.	9	17 1/2	17 1/2	-	15 Oct.	-	9	17 1/2	17 1/2	-	15 Oct.	-	9	17 1/2	29 "	-	9	17 1/2	17 1/2	-		
Ditto	2	-	-	-	-	-	29 "	7 1/2	23	23	-	15 "	6 1/2	40	40	-	15 "	-	6 1/2	40	40	-	15 "	-	6 1/2	40	29 "	-	6 1/2	40	32	32		
Ditto	3	-	-	-	-	-	29 "	10 1/2	10 1/2	10 1/2	-	29 July	2 1/2	32	32	-	29 "	-	2 1/2	32	32	-	29 "	-	2 1/2	32	15 Oct.	-	2 1/2	32	6 1/2	6 1/2		
Ditto	4	-	-	-	-	-	29 "	8 1/2	8 1/2	8 1/2	-	29 "	5	7 1/2	7 1/2	-	29 "	-	5	7 1/2	7 1/2	-	29 "	-	5	7 1/2	29 July	-	5	7 1/2	8 1/2	8 1/2		
Ditto	5	-	-	-	-	-	25 "	5 1/2	9	9	-	29 "	3	45	45	-	29 "	-	3	45	45	-	29 "	-	3	45	15 Oct.	-	3	45	11	11		
C. officinalis	1	15 Dec.	8 1/2	12 1/2	12 1/2	-	4	8 1/2	22 1/2	22 1/2	-	15 Oct.	4	46	48 1/2	-	15 Oct.	-	4	46	48 1/2	-	15 "	-	4	46	15 "	-	4	46	20 1/2	20 1/2		
Ditto	2	15 "	7 1/2	10 1/2	10 1/2	-	15 Oct.	6	18	18	-	15 "	5 1/2	36	36	-	15 "	-	5 1/2	36	36	-	15 "	-	5 1/2	36	15 "	-	5 1/2	36	35 1/2	35 1/2		
Ditto	3	15 "	11 1/2	14	14	-	15 "	11 1/2	19 1/2	19 1/2	-	15 "	5	28	28	-	15 "	-	5	28	28	-	15 "	-	5	28	15 "	-	5	28	29 1/2	29 1/2		
Ditto	4	15 "	6 1/2	9 1/2	9 1/2	-	15 "	6 1/2	15	20	-	15 "	5 1/2	49 1/2	50 1/2	-	15 "	-	5 1/2	49 1/2	50 1/2	-	15 "	-	5 1/2	49 1/2	15 "	-	5 1/2	49 1/2	38 1/2	38 1/2		
Ditto	5	15 "	5 1/2	8 1/2	8 1/2	-	15 "	5 1/2	17 1/2	21	-	15 "	5	41 1/2	41 1/2	-	15 "	-	5	41 1/2	41 1/2	-	15 "	-	5	41 1/2	15 "	-	5	41 1/2	38	38		
Ditto	6	15 "	5 1/2	8 1/2	8 1/2	-	15 "	6 1/2	16	18 1/2	-	15 "	5 1/2	10 1/2	10 1/2	-	15 "	-	5 1/2	10 1/2	10 1/2	-	15 "	-	5 1/2	10 1/2	15 "	-	5 1/2	10 1/2	48	48		
Ditto	7	15 "	5 1/2	8 1/2	8 1/2	-	15 "	6 1/2	13	13	-	15 "	5 1/2	13	13	-	15 "	-	5 1/2	13	13	-	15 "	-	5 1/2	13	15 "	-	5 1/2	13	18 1/2	18 1/2		
Ditto	8	15 "	4 1/2	7 1/2	7 1/2	-	15 "	7 1/2	16	16	-	15 "	5	12 1/2	12 1/2	-	15 "	-	5	12 1/2	12 1/2	-	15 "	-	5	12 1/2	15 "	-	5	12 1/2	17 1/2	17 1/2		
Ditto	9	15 "	7 1/2	23 1/2	23 1/2	-	15 "	7 1/2	23 1/2	23 1/2	-	15 "	6	15 1/2	15 1/2	-	15 "	-	6	15 1/2	15 1/2	-	15 "	-	6	15 1/2	15 "	-	6	15 1/2	17 1/2	17 1/2		
Ditto	10	15 "	10	16 1/2	16 1/2	-	15 "	7 1/2	8 1/2	8 1/2	-	15 "	5 1/2	16 1/2	16 1/2	-	15 "	-	5 1/2	16 1/2	16 1/2	-	15 "	-	5 1/2	16 1/2	15 "	-	5 1/2	16 1/2	17 1/2	17 1/2		
C. Pahudiana	1	15 "	5	13	13	-	15 "	5	14	14	-	4 July	5	14 1/2	14 1/2	-	15 "	-	5	14 1/2	14 1/2	-	15 "	-	5	14 1/2	15 "	-	5	14 1/2	16 1/2	16 1/2		
Ditto	2	28 Mar.	5	7 1/2	7 1/2	-	15 "	5	4	5	-	4 "	5 1/2	23	23	-	15 "	-	5 1/2	23	23	-	15 "	-	5 1/2	23	29 "	-	5 1/2	23	34	34		
Ditto	3	28 "	3	13 1/2	13 1/2	-	15 "	4 1/2	14	14	-	4 "	4	18 1/2	18 1/2	-	15 "	-	4	18 1/2	18 1/2	-	15 "	-	4	18 1/2	15 "	-	4	18 1/2	55 1/2	55 1/2		
Ditto	4	15 Dec.	2 1/2	8 1/2	8 1/2	-	15 "	5	15	15	-	4 "	3	19	19	-	15 "	-	3	19	19	-	15 "	-	3	19	29 "	-	3	19	44	44		
Ditto	5	15 "	2 1/2	8 1/2	8 1/2	-	15 "	5	25	26	-	4 "	3	29 1/2	29 1/2	-	15 "	-	3	29 1/2	29 1/2	-	15 "	-	3	29 1/2	29 "	-	3	29 1/2	56	56		
Ditto	6	15 "	2 1/2	8 1/2	8 1/2	-	15 "	5 1/2	15	15	-	4 "	2	16 1/2	16 1/2	-	15 "	-	2	16 1/2	16 1/2	-	15 "	-	2	16 1/2	29 "	-	2	16 1/2	40 1/2	40 1/2		
Ditto	7	28 Mar.	3 1/2	12 1/2	12 1/2	-	15 "	5 1/2	10 1/2	10 1/2	-	4 "	3	15 1/2	15 1/2	-	15 "	-	3	15 1/2	15 1/2	-	15 "	-	3	15 1/2	29 "	-	3	15 1/2	45 1/2	45 1/2		
Ditto	8	15 Dec.	2 1/2	8 1/2	8 1/2	-	15 "	5 1/2	10 1/2	10 1/2	-	4 "	2 1/2	22	22	-	15 "	-	2 1/2	22	22	-	15 "	-	2 1/2	22	29 "	-	2 1/2	22	33	33		
Ditto	9	15 "	4 1/2	9 1/2	9 1/2	-	15 "	5 1/2	9 1/2	9 1/2	-	4 "	3	36	36	-	15 "	-	3	36	36	-	15 "	-	3	36	29 "	-	3	36	37	37		
Ditto	10	15 "	2 1/2	8 1/2	8 1/2	-	15 "	5 1/2	11 1/2	11 1/2	-	4 "	4	40	40	-	15 "	-	4	40	40	-	15 "	-	4	40	29 "	-	4	40	40	40		

— V. —

CHINCHONA CULTIVATION IN THE KANGRA VALLEY (PUNJAB).

— No. 1. —

EXTRACT of a LETTER from Captain *W. Nassau Lees*, LL.D., to the Secretary to the Government of the Punjab.

Sir,

Calcutta, 31 December 1863.

I HAVE received your letter, dated 7th ultimo, with enclosures, from Colonel Lake, and the Deputy Commissioner of Kangra.

3. I would solicit the favour of your directing the local authorities to make over to me 25 acres of the Kusmul plot of reserved land, which the Lieutenant Governor of the Punjab, in your demi-official letter, dated Murree, 31st July last, has permitted me to purchase at the average cost of the sale.

4. Since my letter, however, was written, I have visited the Kangra Valley; and I am able to state that it is of the greatest importance to my experiment to obtain more land adjoining the spot in which I am placed, for I am now completely hemmed in and surrounded by Captain Batt, the Government, and the Nassau Tea Company's lands; and I hope therefore, that if any other forest land can be obtained more suitable for the Holta Tea plantation than that at Kusmul, the Lieutenant Governor will still make over to me the remainder of this land on similar terms, or any others that he may think proper. As a tea planter I can assure the Lieutenant Governor, without fear of contradiction, that it is not well suited for the purposes for which it is now reserved.

5. I have already erected buildings of a considerable extent, all of stone masonry, a bothouse, on the Paxton principle, propagating hot and cool pits 64 feet long, in all about a 100 running feet of glass, besides gardeners' houses, &c., and I am building a dwelling house. I cannot surely remove these buildings. My gardener has left England. He is now at the Botanical Gardens of Ceylon; and will proceed thence to Ootakamand, where it will be seen by the annexed letters that fitting arrangements have been made for insuring his efficiency by instruction in his business.

6. It is true that I have now at Kangra only 30 Chinchona plants, but most of these are stock plants, strong and healthy, of 12 to 16 inches in height, with good solid woody stems; and, with the apparatus which I have prepared on the spot, as soon as the gardener gets to work, he can propagate to the extent of hundreds if not thousands, in a few months. He will, moreover, bring with him fresh supplies of plants from Ceylon and Ootakamand; and, with his Honour's further aid, I have every hope of signal success. I may mention that my very young plants were planted out in the forest, and, without any protection, have been exposed to the heat and rain from April to October—a test of climate to which Chinchonas have not been submitted in any other part of India.

7. As to anyone inspecting my plantation on the part of Government, I can possibly have no objection. I specially solicited the late Viceroy to do so, and undertook a journey of 3,000 miles that I might personally show his Excellency my plantations at Holta.

8. If the Lieutenant Governor would ask permission of the Government of

India for Dr. Anderson to report on the capabilities of the Kangra Valley for Chinchona cultivation, he would confer a signal benefit upon me, and all intending cultivators of the Chinchona plant throughout the Punjab, and I would most willingly submit my plantation to his inspection, or to that of Mr. McIvor, could he be spared from Madras to come round here.

9. I do not, however, think that before my experiment has failed, it is to the interest of Government and of the public that it should be rivalled or opposed. On the contrary, it would seem to be on every ground expedient that my experiment should be an adequate one, and its results widely and speedily felt; and I trust therefore that his Honour will consider himself justified in determining to serve me and to forward my undertaking, without reference to anyone. I forward copies of very kind letters received from Professor Balfour of the Royal Edinburgh Botanical Gardens, from Mr. Thwaites, the Superintendent of the Botanical Gardens, Ceylon, and also an interesting and important correspondence from Java, illustrative of the generous sympathy of the Dutch Government with the Indian experiments, and of the attention and valuable assistance of Her Majesty's consul at Batavia. These letters, in addition to what I have myself stated, will be sufficient evidence to show that I am in earnest, and doing all that the Government itself could do, without subjecting me to the inconvenience and probable heavy loss which may be caused by the delay of further references. It will be seen that I have procured some *C. Calisaya* seeds; and am thus, I believe, the first importer of the seeds of that highly valuable species of the plant into India. I would respectfully add, moreover, that as I am going to carry out my experiment myself, and to place it under the superintendence of a person whom I shall have taken measures specially to qualify for the duty, I am best able to say what assistance I require. This I have already done, and I earnestly hope that his Honour will considerably favour me with an early reply.

10. The Lieutenant Governor will readily understand that if I obtain assistance from Government my experiment will be carried out on a larger and more extended scale than if I am left to carry it on unassisted and alone; and that were Government to open a rival plantation mine must subside altogether, as I could not afford to carry it on with a prospect of reimbursement deferred to a distant future. He will, I hope, then perceive how unfair it would be that I should be led to incur large expenses, under the delusion that I am to obtain Government aid, or to be unrivalled.

11. I am certain that Sir Robert Montgomery will excuse the liberty I take in putting the matter thus plainly before him, for he will doubtless be able, without difficulty, to see that, under the circumstances, delay in ascertaining the position in which my experiment stands may involve me in very serious pecuniary loss.

12. With reference to Kooloo and its capabilities for Chinchona cultivation, as the selection of this valley was a suggestion made by Colonel Lake, I venture to add, without stating other patent drawbacks, that I was informed, when at Kangra, that the rainfall there is only about from 18 to 20 inches, and I have learned since, that the neighbourhood was visited by a snow storm on the 31st of October last, so severe, that 50 natives perished between Kooloo and Lahoul. These facts, if they are facts, would not seem to indicate this locality as the most favourable, in those regions, for the cultivation of an inter-tropical plant; and it is on these grounds, and in the interest of my own experiment, and not with the intention of assailing anyone's character or reputation, that I desire to urge on the Lieutenant Governor that the idea of transferring the experimental cultivation of Chinchonas from the Kangra to the Kooloo Valley be abandoned.

Enclosures in No. 1.

EXTRACTS of Letters from the Private Secretary to his Excellency the Viceroy and Governor General.

My dear Lees, Holta, 26 October 1863.
THERE is no possibility of H. E. being sufficiently well to-morrow to plant your Chinchona.

Should the rain cease and the morning be quite fine Baring and I will be with you to-morrow at half-past six o'clock.

Very sincerely yours,
(signed) *T. J. Hovel-Thurlow.*

My dear Lees, Holta, 1 November 1863.
LORD ELGIN desires me to express to you his deep regret that, after you should have undertaken a hurried journey of some thousands of miles for the special purpose of being on the spot at the time of his Excellency's visit to your Chinchona plantations, the state of his health should compel him to postpone it until some more favourable opportunity.

The interest which Lord Elgin has always taken in the growth of Chinchonas is very great. Years ago, in Java, I accompanied him on a tour of inspection through the Dutch Government plantations in that island, and even then he inquired minutely into the peculiarities of the soil and climate, with reference to the success which might attend the introduction of this plant into this country. From this you may judge for yourself how great is the disappointment which this illness has caused him. He has, however, desired me to describe to him all I saw when you, the other day, so kindly showed Baring and myself over New Quito,* and his Excellency trusts that whenever circumstances may enable him to pay his promised visit, you may be approaching that success which should, and sooner or later must, attend your exertions in this field of improvement to which you have devoted so much of your time and real interests.

Very sincerely yours,
(signed) *T. J. Hovel-Thurlow,*
Private Secretary.

Royal Botanic Gardens, Edinburgh,
24 October 1863.

Dear Sir,
I HAVE this day secured the services of a gardener for you. His name is John McKay. I believe him to be an excellent gardener. He is sober and steady, and has good testimonials; I have every reason to hope that he will suit you. He is working in the Botanic Gardens here before he leaves, so that he may see everything new in the way of cultivation. I am now expending the 20*l.* you sent for outfit, and passage to London and Southampton. I have written to Mr. Mackintosh Balfour in London, and asked him to arrange about the passage by the steamer of 4th November. I shall attend to your direction as to his calling on Mr. Balfour and Mr. Markham. I suppose that Mr. Balfour will arrange for his remaining at Ceylon for 10 days, before going to Madras and then to Calcutta. I shall give him letters to Mr. Thwaites and Mr. Melvor.

He has signed the contract, and I now transmit it to you. I shall send you an account of the disbursements made on his account.

Our mutual friend, Sir David Brewster, sent a kind note to me in regard of you.

I shall always be glad to aid you, and I shall be delighted to hear of your success in Chinchona and tea cultivation.

Captain Lees.

I am, &c.
(signed) *J. H. Balfour, M.D.,*
Professor of Botany.

Royal Botanic Gardens, Ceylon,
18 November 1863.

My dear Sir,
I HAVE this moment received your letter of the 9th instant, and, in reply thereto, beg to assure you that it will afford me much pleasure to aid you in your interesting experiment in

* Mr. Thurlow does not mean that I was actually present, as he and Captain Baring were prevented by heavy rain from visiting New Quito on the day fixed, and I was obliged to leave immediately for Calcutta.

in the way you request. I shall not, however, be able to send the plants as soon as you wish, but they could go a mail or two afterwards, at the same time that I shall be sending other cases of Chinchonas for India.

As the expense of cases and carriage to Galle is considerable, I must ask you to place 10*l.* or 12*l.* to my credit at the Oriental Bank Corporation to meet this expense. The balance I will return to you as you may direct.

If the man you mention arrives here, I will give him every information in my power; he should be furnished by you with money for his expenses in getting to our Chinchona garden, and for his board and lodging in the neighbourhood. Coach fare from Galle to Kandy is 5*l.*, and the same back, and from this to our Chinchona garden and back, with expenses there, would cost about 15*l.* So he ought to have at least 30*l.* in his pocket to meet these expenses.

Our excellent Governor, I am sorry to say, is going immediately to England on account of ill health.

Believe me, &c.

(signed) *G. W. A. Thwaites,*
Director.

My dear Sir,

Batavia, 13 December 1863.

I AM in receipt of your letter of the 1st September, and would have answered it sooner, but have only returned from a trip to the hills, where I have been for a short time. Your letter to Mr. Loudon I immediately sent him. I called on him a few days after, and I am glad to say that, through his influence with Dr. Junghuhn, the superintendent of the Chinchona plantations, I am enabled to send you 100 of the *Calisaya* seeds, which I am sure you will find very welcome. Enclosed you have a letter from Mr. Loudon. I also, at Mr. Loudon's request, send you a copy (translation) of Dr. Junghuhn's letter to him which I am sure you will find interesting with regard to the *Chinchona Pahudiana*.

Mr. Loudon has just been appointed by the King of Holland, a member of Council, and has begged me to request you, in reference to Chinchona seeds or plants, to correspond with Dr. Junghuhn direct, if you will send your letters to me. I will take care they are duly forwarded, Mr. Loudon will still use all his influence with Dr. Junghuhn to assist you as far as possible. I return your letter for Dr. DeVry, who left for Europe sometime ago.

I am no relative of McLachlan of McLachlan. The name of your uncle is well known to me.

I am, &c.

(signed) *James McLachlan.*

Captain W. Nassau Lees, LL.D.

&c. &c. &c.

Calcutta.

My dear Sir,

Batavia, 14 December 1863.

I WAS duly favoured with your kind and very interesting note of the 1st of September, which I sent Dr. Junghuhn, begging him, if possible, to comply with your request.

He accordingly sent me 50 *Calisaya* seeds, which I enclose, with a translation in extract from his letter, which perhaps may prove to be not without interest. May I join to this a request, which is, that if possible you might provide Dr. Bourne with a small quantity of the seeds. I promised that gentleman to send him 100 seeds, which I have not yet received. Perhaps you might divide again what I might send you or him afterwards.

Wishing you all possible success, I remain with sentiments of high consideration,

My dear Sir, &c.

(signed) *A. Loudon.*

W. Nassau Lees, LL.D.,

Calcutta.

TRANSLATION.

Dear Sir,

Lembaug, 3 December 1863.

WITH the greatest interest I have perused the letters you have had the kindness to send me with your valued favours of 25th November last, and return them herewith. That the Chinchona of the Neilgherry, cultivated from slips or suckers are so weak (tender), does not surprise me; this I had experienced here since long. Only the Chinchona plants cultivated from seeds become strong trees, and it is a pity that specially the best species (*Calisaya, lancifolia, succirubra*) so very seldom bear flowers and produce fruit. It was just

just yesterday I gathered the first 100 *Calisaya* fruits, of which I send 50 seeds herewith. I don't know as yet how many are in them; should it be more than 1,200 then I can send you next post another 50; they are very rare, and each grain of seed is worth at least 100 florins. I am now erecting a hot-house, intended exclusively to force the *Calisaya*, *lancifolia*, and *succirubra* trees to produce fruit (in the hot-house).

Do you know perhaps if, and what, the British India Government has answered to the request for *Condaminea* plants?

I read the news, that the cultivation of the *C. Pahudiana* has been suspended in British India (as Sir Nassau Lees writes) just on a day that I could chuckle at it. I had just finished examining one of the oldest of our Pahudiana trees (a slice of the bark of the Pahudiana No. 22, at Tjibodas), and I could smile at it, because I now have the certainty to see the time in which they will be eager to have the much despised and scorned at Pahudiana. Although this tree is still a sapling, and has not yet branches, except on the top; it has already more than 3 p. c. alkaloids, viz. 1.525 quinine and 1.500 Chinchona, which last named turns into quinine when the bark becomes older, as all keen observers say. Two years ago Professor Mulder found in a similar specimen, consequently a much younger tree, 0.9 quinine and 1.3 chinchonine, or 2.2 per cent. alkaloid.

It is clear that the alkaloid basis increases every year; that, however, the development of a considerable quantity of alkaloid in the Pahudiana takes place at a later period than in other specimens, because it is comparatively younger, viz. must by nature grow higher, and, thus not thicken as early as the others.

When you are in the opportunity of speaking to his Excellency the Governor General please bring this under his notice.

I should have sent already my chemical report by this post, but I am still occupied with the leaves of the *C. succirubra*, in which Dr. Anderson asserts to have found quinine. To make my work complete, I will add the result of this investigation to my report. Kindly request the Governor General to appoint somebody to cut off, in my presence, of the same Pahudiana, at Tjibodas, a slice of the bark, and to send it to Batavia to be examined, otherwise the good friends of the Pahudiana will accuse me of mystification.

My compliments, &c.

Loudon.

(signed) F. Junghuhn.

Dear Sir,

Lembaug, 6 December 1863.

I HAVE the pleasure to send you still 50 *Calisaya* seeds to complete the 100 intended for Mr. Lees. The first crop has yielded 1,288. I will hope that also the other 600 fruits may ripen.

The *C. succirubra* leaves really contain alkaloid, viz. 0.520 p. c. of which 0.400 quiniæ. They are also rich in (Kmalooistofzuur?) and can be made an article of trade, not for preparing quinine but quinium.

I should now act in a consequent order if I examined also the leaves of the *Calisaya*, *lancifolia*, and *Pahudiana*, which contain perhaps also alkaloid, but I think to delay it because the breathing of alcohol and ether for months long begins to disgust me.

Wishing, &c.

(signed) F. Junghuhn.

P.S.—That the leaves of the Chinchona contain alkaloid is entirely a new fact, till now unknown in the science. Dr. Anderson has the honour of the first discovery regarding the *succirubra*: I that of first fixing the quantity. Of the other specimens nothing is known yet.

True copies of Dr. Junghuhn's letters to Alexander Loudon, Esq., Secretary General to the Ned. Indian Government.

Batavia, 13 December 1863.

(signed) James McLachlan.

— No. 2. —

From Captain W. Nassau Lees, L.L.D., to the Secretary to the Government of the Punjab.

Sir,

Calcutta, 28 April 1864.

IN continuation of my letter of the 31st December last, regarding my Chinchona experiment in the Kangra Valley, I beg to report, for the information of

the Government of the Punjab, that Mr. McKay, my gardener, arrived in Calcutta in the end of January, bringing with him a supply of Chinchona plants from Ceylon and Ootakamund, as follows:—

From Ceylon.

24	C. succirubra, one case.
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From Ootakamund.

150	C. succirubra.
316	C. Condaminea (very young seedlings in pots).
14	C. micrantha.
2	C. Calisaya.
4	C. Peruviana.
Total 486	plants, packed in four Wardian cases.

2. Half of the plants from Ceylon died before reaching this, evidently from not having been properly shaded during the voyage, as the plants were planted in four rows, and all those in the two outer rows were dead, while those in the two inner rows were alive and healthy. These plants were remarkably fine—the finest I have ever seen sent round here—averaging from 14 to 18 inches in height, with large succulent leaves; but I think that plants of about 3 to 3½ inches high, if healthy and well established in the cases, are the best for sending long distances by land. They are less liable to damage by shaking, and a greater number may be contained in a small space.

3. The plants from Madras, all except the Condaminea seedlings in pots, and those in one case which met with an accident, arrived in truly splendid order, as fresh as they left the gardens at Ootakamund, and all growing vigorously. Chinchona seedlings are very delicate, and even at the best season of the year, there is great risk in sending them long journeys. They were not looking remarkably healthy when they reached Calcutta.

4. The greatest difficulty, however, was yet to be overcome—the transport of the plants from here to Hoshearpoor, a distance of about 1,300 miles, and from thence through the hills for 80 or 100 miles more. Two of the cases were very large and cumbrous, and it seemed almost impossible to transport them on men's shoulders through a hill country, if the plants survived the long land journey to the hill foot. At the instance of Sir Charles Trevelyan, Mr. Palmer, the agent of the East India Railway, very kindly made special arrangements for the conveyance of the plants the whole way to Allyghur by passenger train, at goods train rates. By this arrangement the gardener was able to travel with the plants, and Mr. Palmer furnished him with letters to the Railway Authorities at the several breaks along the line, to procure him every assistance and to prevent detention. Mr. McKay left Calcutta on the night of the 9th February. At Allyghur, the Indian Carrying Company placed a whole waggon at my disposal, and Mr. McKay proceeded by Dāk, awaiting the arrival of the plants at the several stages—Delhi, Kurnal, Umballah, Ludianah, and Jullundhur, at each of which he carefully examined them.

5. The plants arrived at Jullundhur on the 26th February, having been thus 17 days on the journey from Calcutta, and on the same day Mr. McKay reported as follows:—

“The plants arrived here this morning; they do not look half so well as when they left Calcutta, but I think I will get more than two-thirds up. The large case, which looked so well in Calcutta, looks wonderful yet. I have sent them on this evening. I had to get 18 coolies, as I thought it a pity to take them out of the cases after getting them so far on the way.”

6. Much difficulty, however, was experienced in getting the plants through the

the hills to their destination. The coolies several times threw the cases down and refused to carry them any farther, leaving Mr. McKay, who was of course unable to speak a word of their language, sitting disconsolate on the side of the hill with his precious plants. By dint of perseverance, however, he safely reached Nassau on the evening of the 1st March, with his five large cases of plants all looking wonderfully well, except that containing the pots of *Condaminea* seedlings. Of these, about 80 per cent. had died on the road, and the remainder looked weak and sickly.

7. Here Mr. McKay allowed the plants to rest for a few days, and on the 7th they were all removed to New Quito, a distance of about five miles, where Mr. McKay pitched his tent and prepared to commence his operations.

8. On an examination of the cases, the following result was obtained:—

NAMES.	Packed in Cases.	Reached alive.	Died.	REMARKS.
<i>C. succirubra</i> - - -	150	117	33	* These all died before reaching Calcutta, as explained above.
<i>C. ditto</i> - (Ceylon) -	24	12	12*	
<i>C. Calisaya</i> - - -	2	2	—	
<i>C. Peruviana</i> - - -	4	4	—	
<i>C. micrantha</i> - - -	14	11	2	† All seedlings.
<i>C. Condaminea</i> - - -	316	67	249†	
TOTAL - - -	510	213	296	

9. Excluding the sickly *Condaminea* seedlings, the 12 *C. succirubra* of Ceylon, neither of which are fairly debitable to the account, it appears that out of 172 healthy Chinchona plants, 146 were landed alive, on a plantation distant nearly 3,000 miles from Ootacamund; and when we consider that the greater portion of the distance was a land journey, involving a passage of 80 or 100 miles through valleys and over two high mountain ranges, it must be admitted that the result is extremely satisfactory, and highly creditable to Mr. McKay.

10. Of the site of the plantation Mr. McKay reports:—"It is a most beautiful place, and will do well, I think, for Chinchonas;" and again, "some of the planters here are under the impression that Chinchonas will not grow on fir or pine plantations, but I think they will, for I have found capital Chinchona soil about 200 yards above where my tent is now pitched."

11. Regarding the state of the plantation when Mr. McKay reached it, I make the following extracts from his letters:—"There are 18 bamboo baskets here, made by Mr. Taylor, for covering Chinchonas when planted out; but they are so wide, they will neither keep out heat nor cold." "The large pit is perfectly useless for Chinchonas, unless it be altered by making it span-roofed." "On examining the flues I find they will not do, as the flue of the large pit runs on a level, whereas it ought to have a gradual rise from the fire to the chimney. I also tried the small house; it draws a little, but the smoke comes through the flue into the house." "I must say the place and everything in it is in a very rough state."

12. To Mr. Rogers, the superintendent of the Government tea plantation at Holta, I am under great obligations, and I am happy here to record them. Mr. McKay says of him:—"To Mr. Rogers I am greatly indebted for his attention. He has provided me with everything, and asked me to go and live at his house; but I did not wish to leave my plants. I have found him very kind, and he has promised to assist me in all my wants."

13. Of the number of plants on the plantation, Mr. McKay says:—"I went

to the plantation to-day (5th March) with your assistant tea-planter, Mr. Turnbull. From what Mr. Taylor told me at Jullundhur, I had expected to find more Chinchonas at the place. There are five in pots in the propagating house, and one planted out,* which is almost dead; six altogether, and nine seedlings, of which I could not make out the species.†

14. I have not made these extracts with the object of disparaging Mr. Taylor, who is, no doubt, as good a horticulturist as he is a sharp and intelligent man. He might have succeeded had he devoted himself to the duty; but to manage a Chinchona plantation 150 miles off, with the aid of a native gardener on the spot, is not possible. I saw 12 fine Chinchonas on this plantation in October last, all growing vigorously, and the day I left 16 cuttings were taken; and in chronicling the result as to these plants, and the appliances for their propagation, I desire simply to add force to those arguments before adduced by me, and in which I am supported by Mr. Markham and Mr. McIvor, that the experimental cultivation of Chinchonas in regions foreign to their natural growth is not likely to be attended with successful results, or indeed with any results at all, unless care be taken to ensure that those who are entrusted with the duty have some qualifications for it, and have had fair opportunities of making themselves acquainted with the requirements of the special cultivation these plants require. No doubt, when the cultivation has passed beyond the experimental stage, and a good model plantation has been formed, where private persons may themselves go, or send their gardeners to learn all the details of the cultivation, considerable success may attend their efforts in the rearing of well grown and healthy plants; but I doubt much their success in rearing plants from seeds, or in propagating young seedlings requiring careful preparation of soil, delicate adjustment of temperature, and, above all, the most cautious and judicious regulation of moisture, without proper appliances, and the aid of skilled gardeners.

15. Of Mr. McKay, Mr. McIvor speaks in the following terms:—"I had the pleasure to receive your letter of the 23rd ultimo (December 1863), and a few days after Mr. McKay came from Ceylon. I have shown him every operation as carried on here, and, as he seems an active and intelligent young man, I have no doubt he will be able to carry out all he has seen, more especially as he performed all the operations with his own hands, and consequently is not likely soon to forget them." "I regret that the seeds of the *C. succirubra*, which flowered, are not yet perfected. When they are quite ripe, I shall send you a few in a letter." And Mr. Thwaites, of Ceylon, who speaks in equally favourable terms of him, has solicited his aid as a collector of plants.

16. We have good grounds, then, to assume that the experiment is in proper and careful hands, and that it will receive such attention as to insure for it a fair trial, fairer, certainly, than if Government imported the plants and sold them at half their cost to natives and the European tea planters in the valley. If it succeeds, the Punjab will derive all the benefit that it could do if Government itself undertook the carrying of it out; while, if it fails, it will probably be from circumstances Government could not have controlled.

17. Of his operations since his arrival at the plantation, Mr. McKay has kept me accurately informed; and it will be seen by the extracts from his letters which I append, that he has not been idle. He has planted out eight of his best plants to test the soil and climate; he has propagated 88 plants, layered one, and sown the hundred Calisaya seeds I sent him, and, by the latest reports, all appeared to be doing well. Of the seeds, 75 were received in December. Mr. McKay was not then here, and I would not entrust them to any one else. I therefore took a small stoppered bottle, heated it in the sun, and thoroughly dried it inside by means of a piece of cotton fixed on the end of a stick; I then closely stoppered the bottle and covered the top and neck with sealing-wax. Many people told me I was wrong in doing so, and that the seeds should have ventilation. The second batch of seeds, 25 in number, did not arrive till February, or two months later. They came in a letter, and that I might test both methods of preserving these diminutive, delicate, and precious seeds, I
despatched

* This is the plant which was taken down to Holta for the late Lord Elgin to plant. He saw it; but was too ill to plant it.

† They are *C. Pahudiana*, from Java.

despatched them, packed as they came, to New Quito. Of those packed in paper but 4 per cent. germinated in 25 days; while of those which had been sealed up in the bottle for three months after their arrival, 27 per cent. germinated in 15 days. This test, however, cannot as yet be considered a complete one, so I have directed Mr. McKay to report more fully the result as he observes it.

18. Mr. McKay's reports on the weather are such only as he could give without the aid of instruments; but it is satisfactory to observe that he is alive to the necessity of taking such observations. Before, however, his application was received, I had applied to Colonel Norman on the subject, and his Excellency the Governor General having immediately sanctioned my application, the instruments* are now packed and ready, waiting only for an opportunity to send them off. If, therefore, Mr. McKay attends to his instruments with that regularity which is essential to insure an accurate record, besides materially assisting in determining those species for which there are the greatest probabilities of success, I shall be able to furnish Government with a series of meteorological observations of considerable value. The taking of these observations, however, requires some experience, and the utmost regularity and care, and perhaps Mr. McKay will not, at first, be entirely successful, but I am certain he will do his best. He will be instructed to try and train a native to assist him, as, without an assistant, in case of his temporary absence, the observations would be interrupted.

*1 Max. and Min.
Thermometer.
1 Hygrometer.
1 Mountain Barometer.
1 Rain Gauge.

19. From the appearance of the 12 plants I saw at New Quito in October last, I was of opinion that the *Condaminea* variety of *C. officinalis* would ultimately be found to be best suited to the Kangra Valley. This opinion I communicated to Mr. Markham in December last; and Mr. McKay's short experience seems to confirm it. All, however, is yet experiment, and I will not, therefore, venture to express myself confidently on any of the points involved in the inquiry until after next cold weather.

20. In the meantime, I shall furnish his Honor the Lieutenant Governor with monthly tabular statements and half-yearly reports, showing the progress of the experiment, and any other information he may wish to have.

N.B.—I have just time to record the receipt, this day (27th April), of a packet of Chinchona seeds of a most valuable species, the *C. Pitayensis*, from Clements Markham, Esq., of the India Office, and the despatch of the same in a registered packet to my plantations at Kangra. From the high altitude at which this species grows, and the very low temperature to which it is subjected in its natural regions, there is good reason to believe that it may succeed, if any species of Chinchona will succeed in the Punjab. The *C. Pitayensis*, Mr. Markham says, is the true Pitayo bark of New Granada, and these seeds were collected by Mr. Cross, the gardener, whom he employed for that purpose last August. The trees were growing on mountain ridges, or in damp ravines near the city of Popayan, at very great altitudes, where it sometimes freezes. Temperature 30° to 60° Fahrenheit. The bark from the same trees was analyzed by Dr. Jameson of Quito, and yielded 3·2 per cent. of quinine. The Pitayo is a well-known species, and highly valuable bark of commerce, like the red, yellow, grey, and crown barks.

Enclosure in No. 2.

EXTRACTS from the Reports of Mr. *John McKay*, Head Gardener in charge of the Chinchona Plantation of Captain *W. Nassau Lees*, LL.D., at New Quito, Kangra Valley, Punjab.

Dated 4 March.

ON Saturday I propagated 12 *C. Peruviana* from one of the plants I found here.

(signed) *J. M.*

Dated 20th March.

I SEND you a report of this week's working. I planted 116 Chinchonas in the nursery. The weakest ones I put in pots in the propagating pit. On the 16th I propagated 23 *C. succirubra*, four *Condaminea*, three *micrantha*, and three *Peruviana*, in all 33, this week's propagation. Some of the cuttings I put in the propagating house, and some I plunged in one of the cases; and I observe that those in the cold case are better and look more healthy than those in the propagating house. On the 19th I planted out eight of the best and healthiest of the *C. succirubra* plants that were in the Ceylon case. I planted them eight feet from the road and eight feet apart near the nursery. I will pay particular attention to the growth of these plants, and see how they like the soil.

(signed) John McKay.

OBSERVATIONS ON THE WEATHER.

At New Quito Chinchona Plantation, from 1st to 31st March.

1st to 7th, fine and sunny; wind south-west. 8th, cloudy; atmosphere very close. 9th, thunder, heavy rain, and violent gusts of north wind. 11th, fair. 12th, cloudy. 13th, heavy rain-fall. 14th, fair; wind north. 15th, thunder and rain; wind north. 16th, thunder, rain, and hailstones. 17th to 21st, fair and sunny; wind north. 22d, thunder and rain; wind south. 23d to 28th, fair and sunny; wind south. 29th, very cloudy, with rain. 30th, cloudy, with strong south wind. 31st, fair and sunny; wind north.

31 March 1864.

John McKay.

CHINCHONA PLANTATION, NEW QUITO.

REPORT on the Number and Condition of the Plants.

Number of new plants	-	-	-	-	-	-	-	213
Number of old plants	-	-	-	-	-	-	-	6
Number of old seedlings	-	-	-	-	-	-	-	9
Propagation for the month	-	-	-	-	-	-	-	88
Number of casualties in old plants	-	-	-	-	-	-	-	6
Number of casualties in cuttings	-	-	-	-	-	-	-	8

The number of casualties in the old plants was caused by heavy rain immediately after they were put in the nursery beds. The rest are all healthy, and I shall have a number of cuttings for this month. I layered a plant of *C. Condaminea* on the 18th of March; it is growing very well, and I think it will be rooted about the 10th of April. The seeds which you sent me last have no appearance of germinating, but 30 of those which were in the bottle (sown on the 20th) are beginning to germinate to-day, being sown 11 days. Immediately on sowing them, I sprinkled the surface of the sand with water, and then covered them with a pane of glass, and as evaporation took place in the soil, it came on to the glass, and from the glass back to the soil again, which kept the soil in a proper state of moisture. They have only been sprinkled twice all the time they have been in the ground. I have sown the remaining 45 seeds on the 26th. I will enter the number of seedlings in next month's report, as I hope they will all show by that time.

31 March 1864.

(signed) John McKay.

NEW QUITO CHINCHONA PLANTATION.

Dated 5 April 1864.

I TAKE the liberty of writing to inform you that, having noticed the Chinchona plants which I had in the nursery becoming very unhealthy, I examined their roots and found that the place was infested with large black ants, which were eating the roots, so I was obliged to lift and re-pot them. My cuttings are looking very healthy. I find that *C. succirubra* cannot bear the heat near so well as *Condaminea*, *micrantha*, *Peruviana*, or *Calisaya*. I also find that Chinchona *Condaminea* is much easier of propagation, and grows much faster than any of the others. The layer of *C. Condaminea*, which was layered on the 18th March, has grown half an inch since.

The

The Chinchona seed is germinating very slow; only eight seeds have germinated out of 30, which were sown on the 20th March, and out of the 25 seeds which were sown on the 9th March, only one has germinated, and they have been treated according to the instructions in Mr. McIvor's pamphlet. The meteorological instruments which I want are a barometer, maximum and minimum thermometers, a hygrometer, and a rain gauge; also two thermometers for the propagating houses. I have not examined many of the hills yet, but what I have seen are very rich in tropical plants, such as orchids and some beautiful ferns; two varieties of *Hoya*, *carnosa* and *lutea* (?); two varieties of *Justicia*, *carnea* and *zebrina*, and a few *Gardenia*. There is one very pretty fern here. It grows in very shaded places, and likes damp, the *Adiantum pedatum* (?). I can only name one of the orchids, which is *Dendrobium moniliforme*. I will know the other varieties when they flower. *Ficus Macrophylla* grows quite common. I have also found one variety of the *Jasminum* species, *grandiflorum*. I will examine the hills as the season advances.

(signed) John McKay.

Dated 11 April.

My cuttings are growing very well, especially *Condaminea*. It forms roots much sooner than any of the other species, and is not so subject to damp or mildew. It also bears the heat of the sun much better. I find *C. succirubra* the most difficult to propagate. It will not bear the least moisture. I therefore keep them in a separate case, and only sprinkle them two or three times a week, while the *C. Condaminea* are moistened every morning and evening in sunny weather. The layer of *C. Condaminea* which I layered on the 8th March is a fine healthy plant, about five inches in height. The seed is germinating very slow. The weather is most unfavourable for Chinchonas. We have had five rainy days out of 11. It rained on the 1st, 7th, 8th, 9th, and 10th.

The eight *C. succirubra* plants which I planted out are beginning to grow a little now. I had to cover the surface of the soil about them with charcoal to prevent the roots from rotting, in consequence of the frequent rains.

(signed) John McKay.

— No. 3. —

MONTHLY REPORT on the Number, Distribution, and Condition of Chinchona Plants on the Plantation of Captain *W. Nassau Lees*, at New Quito, Kangra Valley, on the 1st May 1864.

Species.	Botanical Names.	No. of Plants 1st of last Month.	Number Propagated since.	Casualties.	No. of Plants on the 1st of this Month.
1	<i>C. succirubra</i> - - -	159	43	10	192
2	<i>C. Calisaya</i> - - -	10	10	- -	20
3	<i>C. Condaminea</i> (Urit) -	99	52	2	149
4	Ditto (Charg) - -	—	—	—	—
5	Ditto (Cresp) - -	—	—	—	—
6	<i>C. nitida</i> - - -	—	—	—	—
7	<i>C. micrantha</i> - - -	23	7	1	29
8	<i>C. Peruviana</i> - - -	10	3	- -	13
9	<i>C. Pahudiana</i> - -	—	—	—	—
10	<i>C. Pitayensis</i> - -	—	—	—	—
TOTAL Number of Plants - -		301	115	13	403

TABLE II.

MEMORANDUM of the Growth of Eight Plants of *C. succirubra*, planted on the 19th March 1864.

Number of Plants.	Height in Inches when Planted on the 19th March 1864.	REMARKS.
1	12½	In consequence of the unfavourable state of the weather this month, the eight plants of <i>C. succirubra</i> , which were planted out permanently on the 19th March, have grown very little; but since the weather has changed, I water them once a fortnight with liquid manure, which is producing good effects, the leading buds of five plants being fully expanded, and the remaining three are showing signs of growth.
2	12	
3	13	
4	8	
5	15½	
6	11½	
7	9	
8	14	

— No. 4. —

From Captain *W. Nassau Lees*, LL. D., to the Secretary to the Government of the Punjab.

Sir,

Calcutta, July 1864.

I HAVE the honour to forward a half-yearly Tabular Report on the Chinchona experiment I am carrying on in the Kangra Valley, which I trust will prove interesting to the Lieutenant Governor.

2. Mr. McKay found but five plants alive when he reached New Quito. The experiment, therefore, may be said to date from the day he took charge, just four months ago. The abstract result shown is as follows:—

Chinchona plants on the 1st of March 1864	-	-	-	213
Increase by propagation of plants	-	-	-	604
Increase by propagation of <i>Calisaya</i> seeds	-	-	-	40
TOTAL on the 1st of July 1864				857

2. The largest increase is in *C. succirubra*, and the next in *C. Condaminea*, viz., 318 of the former, and 206 of the latter. These are commercially the most valuable of the quina-yielding species of Chinchona. It will be surprising if the former species succeeds in the high latitude of Kangra; and it is satisfactory to report that the plants are growing steadily, and are very healthy. Of *C. Condaminea* I am very sanguine of success. The plants of this species take root more easily, grow more rapidly than any of the other species, and those on the plantation are in every respect in the highest health. It is probable that *C. Condaminea* will eventually be found the species of the Chinchona plant most profitable to cultivate in the Punjab. At the same time *C. succirubra* and *C. Calisaya* are both thriving vigorously, and as the Government of the Punjab have abandoned all idea of making an experiment of its own, it is my intention to give each species a full and fair trial.

3. Of the 100 seeds of *C. Calisaya* received through the kind favour of Dr. Junghuhn from the Dutch Government, 40 per cent, have germinated, 36 per cent. of the seeds mentioned in a previous report as having been put up in a paper packet, and 41½ per cent. of those which were hermetically sealed. The latter are, moreover, very much stronger plants than the former. A similar number

number of seeds were received at the same time by Dr. Anderson, none of which, I am given to understand, have germinated. The 104 seeds of the *Chinchona Pitayensis*, which were collected by Mr. Cross in August last in New Granada, and which Mr. Markham very kindly sent me last May, have not germinated, and a small number of the same batch of seeds, forwarded to me by Mr. Melvor from Ootakamund, have been equally unsuccessful. The seeds on arrival looked good, and after examination through the microscope were pronounced to be so by Dr. Anderson. It is much to be regretted that they have not succeeded, as from the great altitude at which this species of the plant grows, viz. 7,000 to 8,000 feet above the level of the sea, it would be peculiarly adapted to the higher latitudes of the Kangra Valley.

4. This season, I am sorry to say, has been most unfavourable for all agricultural and gardening operations in the Kangra Valley. During the months of May and June, the valley was visited by severe thunder and hail-storms which did great damage. One storm was severe enough to have destroyed all young plants of any kind that were planted out; yet the eight *C. succirubra* plants which are planted out in the open air lived through it, though nearly all their leaves were stripped off by the violence of the storm. Another enemy the planted-out plants have had to contend with was a species of large ant, which infested the spot where they were first put out, and compelled Mr. McKay to lift and re-plant them all in another place. These accidents have checked somewhat the growth of the plants, and it is most encouraging to record that in spite of such serious drawbacks, with the exception of *C. micrantha* and *C. Peruviana*, they are all healthy, and now growing vigorously, especially *C. Condaminea*.

5. Regarding one experiment with this latter species, Mr. McKay writes on the 2nd May, "I measured the young plant of *C. Condaminea*, which I propagated from a layer. On the 1st of this month it was eight inches in height, with rich dark green leaves, the length of which is $4\frac{1}{2}$ inches by $1\frac{3}{4}$ inch breadth, and it is showing buds from every joint. I will be able to take 20 cuttings off the old or parent plant this month. I experience no difficulty in propagating *C. Condaminea*. The cuttings delight in frequent syringing with very little air during the warm part of the day. In the afternoon I syringe them, shut the cases with a little sun heat, and by this treatment the cuttings are growing very satisfactorily."

6. In consequence of the terminus of the railway having been advanced from Bolundshuhur to near Delhi, the person appointed to receive the meteorological instruments which were despatched from here, had moved on, and the instruments were left with the station master for upwards of a month. They have since, however, been forwarded; but the detention is extremely unfortunate, as through it we have lost the observations which, as this season of the year is most trying to young Chinchona plants, would have been of very great value.

7. It will be seen from the remarks of Mr. McKay's Tabular Report that the plants of both *C. micrantha* and *C. Peruviana* are suffering so severely from the extreme heat that their leaves are turning yellow, and dropping off. I am in hopes that this is due to the unusually unfavourable season they have had this year in the Kangra Valley. From this cause all the tea plantations have suffered severely. At Nassau, not a lb. of tea was made in May and for the first half of June; so probably these plants will recover themselves*. I doubt whether the months of May and June are favourable for propagating young Chinchona plants; but it is the cold rather than the heat of the Kangra Valley that we have most to dread, and if that does not affect any of the species when planted out in the open air, I shall be very sanguine of success. At the same time it cannot be expected that all species of the Chinchona plant will flourish in regions of such high latitude, and if I succeed in acclimatizing two or three of the most valuable of the 10 or 12 species of Chinchona which have been imported into India, I shall have accomplished a feat. In attempting to do so, however, much labour and money may be lost in cultivating species for which
the

* See last letter of Mr. McKay, received when this was in the press.

the climate will ultimately prove uncongenial. Indeed so much money has been already laid out in importing plants that have died on the way, and in erecting glass-houses, propagating pits, &c., &c., that I begin to feel very anxious regarding the result, and would therefore again venture to solicit the attention of his Honor the Lieutenant Governor to the 18th paragraph of my letter, dated 8th September last, regarding the efficient carrying out of this national and important experiment.

8. I mean to plant out a few *C. Condaminea* plants, as soon as I have plants sufficient to enable me to do so; but for the present I intend to devote all my energies to propagating as large a number of stock plants as possible. By the end of this year I hope to have from 5,000 to 6,000 plants of all species, and 8,000 to 10,000 in March next. In the rains of next year I intend to plant out, at ten feet apart, about 30 acres, and, if I can get the land, 200 acres the year following.

9. Mr. McKay, besides being most attentive to his duties, seems to take a warm interest in his work, and to be fully alive to the great importance of the experiment with which he has been intrusted. He still receives every assistance and attention from Mr. Rogers, to whom, for his timely help, I am much indebted.

10. I forward extracts from Mr. McKay's weekly reports. It may appear that these extracts are too copious; but should the experiment be successful, they will prove of considerable value as a guide to future experimentalists, and cannot now fail to be interesting, though without further experience, it would not be safe to give publicity to them.

Enclosures in No. 4.

EXTRACTS from the WEEKLY REPORTS of Mr. *John McKay*, Head Gardener, in charge of the Chinchona Plantation of Captain *W. Nassau Lees*, LL.D., at New Quito, Kangra Valley, Punjab.

New Quito, 18 April 1864.

My cuttings are all growing and looking very healthy, the plants are also growing a little now, and next month, I expect to get about 200 cuttings off the old plants; the number of cuttings for this month, up to the 16th, is 44, and 8 seedlings. The seeds are germinating very slowly, but I think the most of the *Calisaya* seeds in the bottle will germinate; the 25 seeds which you sent in the paper, I am much afraid will not germinate, as there are no signs of them, and they are in the soil since the 9th of March. I find that *C. Condaminea* likes this climate better than any of the other species; it grows much faster, and is much more easily propagated; it also delights in frequent syringing, while *C. succirubra* is most sensitive. If the cuttings get the least excess of moisture, they are certain to damp off and rot, and must be kept in a cool shaded place. *C. micrantha*, *Peruviana*, and *Calisaya* are equally as hardy as *Condaminea*, but do not grow so fast.

The layer of *C. Condaminea* which I layered on the 18th of March, is a beautiful healthy plant, about seven inches in height, and I intend layering some more, when I have them large enough.

(signed) *John McKay*.

New Quito, 25 April 1864.

I AM glad to inform you that the Chinchona cuttings and plants are growing fast and look promising; the old plants are shooting out fine healthy buds, which will be ready for cuttings in May. I have some plants of *C. Condaminea*, which were propagated in March, two inches in height now; they were not half an inch in height when propagated.

I am very busy with the building and repairing of the propagating house. I will have it finished about the end of May. There are two houses attached to the north side of the propagating house, and by your permission, I will take them down, and build a potting shed to the east end of the propagating house, and have the two to communicate with one another, so that when the cuttings are made and put into the pots, they can be removed from the potting shed into the propagating cases, without exposing them to the sun, or external atmosphere, of which they are most sensitive.

(signed) *John McKay*.

New Quito, 2 May 1864.

It gives me much pleasure to inform you that the *Calisaya* seeds are daily germinating, and look very healthy. I have been very anxious about those seeds on account of their being so long without germinating; but I see an account in the Blue Book of seed of *Chinchonas*, sown at Ootakamund, which were from 64 to 68 days sown before germination took place, which makes me hope for nearly all the *Calisaya* seed to germinate. With reference to the effects of this climate on the various species of *Chinchona* which are here, I find that *Chinchona Condaminea* forms roots in three weeks, while all the other species are from four to five weeks in forming roots, and are subject to damp and rot, especially *succirubra*; it is one of the most difficult to propagate by cuttings. I cannot say anything about *C. Calisaya*, as there are only two plants of it, which had been very weak, but they are recovering now. I have been able to get one cutting off one of the plants, which has every appearance of forming roots. I regret that I did not get stronger plants of *Condaminea* from Ootakamund, as I am certain, from what experience I have, that *Condaminea* is more adapted for this climate than any of the other species, and I think it will ultimately prove to be so. On the morning of 1st May, there was a fearful thunder-storm, accompanied with showers of large hail stones, which has greatly damaged the eight plants of *C. succirubra*, which were planted on the plantation; it destroyed nearly all their leaves.

(signed) John McKay.

New Quito, 7 May 1864.

THE *Chinchona Pitayensis* seeds were sown on the 6th of May, immediately after receiving them. They all looked healthy and fresh. I will watch all seeds and plants most carefully and attentively, and depend upon it I will do all that can be done for the success of this experiment, with which I am entrusted.

I send for your information this week's proceedings and a report of the *Calisaya* seedlings, which are looking very healthy, with the exception of those which were in paper.

The method which I mean to adopt with regard to the hardening or the tempering of young plants, before planting them out, is, first, I intend, by your permission, to build a cold frame, made of wood, and, as the plants begin to grow in the cutting pots, I take them out, and pot them into three inch pots; then put them into this cold frame, and keep them quite close for eight or ten days; then the air is admitted gradually until such time as they get established in the pots, and begin to grow a little; then they can be exposed day and night until such time as they are planted permanently in the plantation. I am still busy with the building of the propagating house, and the most particular work, such as making and planing the wood for the sashes. I do it all with my own hands, as the carpenters here are very rough workmen, and quite ignorant of such work.

I have also commenced clearing a site for a house 50 yards above the large propagating house; but the soil is so good that I am unwilling to waste so much of it; it is just the sort of soil we grew our pine-apples in Scotland, fine fibrous turfy loam; and I find that the whole of the ridge right up the hill is equally good.

(signed) John McKay.

New Quito, 14 May 1864.

THE cuttings and young rooted plants are all healthy, and the old plants are growing vigorously. The weather is keeping very unsettled and wet. The eight plants of *Chinchona succirubra*, which are planted outside, are still growing and look healthy, although all their leaves were completely destroyed by hail on the night of the 1st; indeed, I am surprised to see them alive, as their roots have been soaking in rain-water since the 1st of this month. The *Calisaya* seedlings are growing and look very healthy. I have every seedling in a three-inch or thumb pot in a compost of leaf mould, brick-dust and sand, equal parts of each. I sprinkle them in the morning and afternoon of every day immediately before sunrise and sunset, and they get as much air and light as they can bear without flagging.

(signed) John McKay.

New Quito, 21 May 1864.

I HAVE the honour to forward for your information the weekly report for the third week of May, and I am happy to state that my cuttings and all the old plants are looking very satisfactory and promising. The *Calisaya* seedlings are growing, and look healthy; not one of the remaining seeds has germinated this week.

I have received the two thermometers and 150 seeds of *Chinchona Pitayensis*, which reached on the 20th, and were sown on the 21st May.

Before I received your instructions not to lift the *Chinchona* plant which had been taken from here for Lord Elgin to plant, I am sorry to state that I raised it on the 28th of March, as I thought it was dead; but I root-pruned it at once, and put it into a flower-pot in a compost of equal parts of leaf, mould, and sand, and it is showing signs of life now; so I think

think it will recover, and if you wish I will put it out again. This week I have examined all the land right from the top of the hill on both sides, and I find that the soil and aspect on this side of the hill is far superior to that on the opposite side, for the cultivation of the Chinchona plant or any other plants.

(signed) John McKay.

New Quito, 31 May 1864.

I do not know where the Chechean lands are, but I will obtain such information from the Commissioner, and visit the place at once; however, I think it will be better to get all the land in this dale at once, because I am sure that the land here is as suitable for the cultivation of the Chinchona plant as any other part of the valley.

I have got all the outside work of the propagating house finished. I have had to replace all the beams and repair all the sashes, and when it will be finished I will get on much faster with the propagation, as it will be a more suitable place than where I have been propagating.

(signed) John McKay.

New Quito, 4 June 1864.

THE Chechean lands only contain 26 acres. I have examined it all, and there are only about 18 acres out of the 26 which I have selected as being fit or suited for the cultivation of the Chinchona plant; the soil is very good, with a north-west aspect; it joins the Koosmal land on the top of the hill, and is well sheltered on all sides. This day, the 4th of June 1864, I have seen 100 acres of land measured for you; 82 acres, 1 rood, 35 poles in Koosmal, and 17 acres, 2 roods, 5 poles in the Chechean lands; in all 100 acres. The timber on the Koosmal land has been greatly cut down of late, and this day I have put a stop to it, and will not allow any of the trees which are cut to be carried away, until I receive instructions from you how to act in this case.

The title deeds of the land are to be made out as soon as possible, and the Deputy Commissioner is to give me whatever assistance I may come in need of.

The soil in the Koosmal land is all very good, with the exception of a few acres, which are very stony. The seeds of *C. Pitayensis* are showing no signs of germinating yet.

My cuttings and all the plants are looking very satisfactory, as also are the *C. Calisaya* seedlings.

(signed) John McKay.

New Quito, 11 June 1864.

THE Chinchona cuttings and plants are all looking very healthy and promising, as also are all the 40 Chinchona Calisaya seedlings; there is no sign at present of any more seedlings. The Chinchona seeds which were sown on the 10th of May last, are showing no signs of germination, and this day, the 11th of June, I have examined the seeds in the pots, Pitayensis, and I am much afraid that very few (if any) will germinate, as they appear to have lost their germinating power. I send you a few which I have taken out of the seed pots, and you will see that they are quite useless, although in appearance they looked healthy and fresh when sown.

I am sorry that I have no melons ready to send; I have had 12 plants planted outside, and had them all destroyed on the 1st of this month by a most destructive hail-storm, which has greatly damaged some of the tea plantations here. Some of the stones which I have measured were $1\frac{1}{4}$ inch in diameter; the storm continued for about one hour. I have sown some more melon seeds, and will force them on as fast as I can.

I have three tea plants here, which I have reared from three seeds, which were sown on the 9th of last March in damp sand above the flue in the propagating house; they are now 7 inches high and very healthy; when I raised them to put them into pots, I found that the stem or tap root was two inches too long for the pot; I therefore took the knife and cut about two inches off the length of the tap root, which has not checked the growth of the plants in any way, and I find that where the root has been cut, is now shooting out fine nourishing fibrous roots.

(signed) John McKay.

New Quito, 20 June 1864.

THE propagating house is now about finished, with the exception of the propagating cases, which will take some time, as I cannot get a proper instrument to cut the glass with.

The cuttings and plants are all growing well, as also are the Calisaya seedlings.

There is no appearance of any of the other seeds germinating as yet, and no more of the Calisaya seeds have germinated since I wrote last.

(signed) John McKay.

New Quito, 25 June 1864.

THE weather is very hot and very trying on the young Chinchona cuttings. There are none of the Chinchona seeds showing signs of germination, and I am sorry that the Chinchona Pitayensis seeds were sown so soon in the season, as I think they would have done much better if they had been kept and sown in the rainy season, as all seeds germinate sooner in moist weather than in hot dry weather. This week, on the evening of the 23rd, the wind had been very strong, and broke a branch off a large pine tree, and unfortunately it fell on one of the eight plants which were planted outside, and completely smashed it; fortunately it was the weakest and smallest plant.

(signed) John McKay.

New Quito, 8 July 1864.

THIS week I have been examining as minutely as possible all the land which you have purchased from Government for the cultivation of the Chinchona plant; it is all good land, and I think 90 per cent. of it will do well for the cultivation of Chinchonas; indeed, it is all far superior to the 10 acres which are at Quito, both as regards aspect and soil; there are only about six acres at Quito, which I think will grow Chinchonas, the remaining four acres contain a very stiff clayey soil, which cakes quite hard after a shower of rain.

The weather is still dry and warm, and if rain do not come soon, all vegetation will suffer severely.

(signed) John McKay.

New Quito, 4 July 1864.

I AM happy to inform you that the plants of the *C. micrantha* are recovering rapidly since the rains set in. *Peruviana* are still unhealthy; but I hope the moisture of this weather will have the same effect on them.

(signed) John McKay.

— No. 5. —

From Sir Charles Wood to the Government of India.

8 August 1864.

1. I TRANSMIT, herewith, the following pamphlets for the use of Dr. Anderson, and others who are engaged in Chinchona cultivation at Darjeeling in the Kangra Valley, or in Assam:—

Thirty copies of Mr. Howard's analysis of the third remittance of Chinchona bark and leaves from the Neilgherry Hills.

Fifteen copies of Dr. Junghuhn's Reports on the Chinchona plantations in Java, for the years 1860 and 1861.

Ten copies of a statement by Dr. Junghuhn, superintendent of Chinchona plantations in Java, with some explanatory notes by Mr. Markham.

Six copies of a preliminary guide to the cultivation of quinine, by Dr. Junghuhn.

2. It will be found that the system of cultivation adopted by Dr. Junghuhn is opposed to that which has been so successful on the Neilgherry Hills; but at the same time it is well that cultivators in India should be possessed of all available information, whether it be in the form of records of examples to be copied, or of mistakes to be avoided.

3. Mr. Howard's report of his analysis of the third remittance of Chinchona bark from the Neilgherry plantations is exceedingly satisfactory, and gives promise of future very important results to be derived from this cultivation.

4. The Chinchona experiment in the Kangra Valley, which has been commenced by Captain W. Nassau Lees, is both interesting and important; for it will test the suitability of a region at a considerable distance from the tropics for the growth of the Chinchona plant. I trust that it will meet with the success which the public spirit and enterprising perseverance of that gentleman fully deserve.

— No. 6. —

From Sir *Charles Wood* to the Government of India.

28 February 1865.

1. I HEREWITH transmit 15 copies of a pamphlet on the cultivation of quinine in Java and British India, by Dr. De Vry, which has been translated from the Dutch. Dr. De Vry was officially connected with the Chinchona plantations in Java for several years; and he has since visited the Neilgherry Hills. His remarks on the comparative merits of the methods of Chinchona cultivation adopted respectively on the Neilgherry Hills and in Java are, therefore, of great value.

2. Copies of the pamphlet should be supplied to Dr. Anderson, Captain W. Nassau Lees, and others who may be interested in the cultivation of Chinchona plants in Bengal, the North-West Provinces, or the Punjab.

— No. 7. —

From Captain *W. Nassau Lees*, LL.D., to the Secretary to the Government of the Punjab.

Sir,

Calcutta, 29 April 1865.

I HAVE now the honour to submit, for the information of his Honor the Lieutenant Governor of the Punjab, my annual report on the cultivation of the various species of the Chinchona plant which I am carrying on in the Kangra Valley of the Punjab; and as the success that has attended my operations affords good grounds for hope that the cultivation has passed the experimental stage, I solicit his Honor's permission first to take a brief retrospect of my operations from their commencement.

Difficulties of
transporting the
plants.

2. The first two cases of Chinchonas, containing 55 plants, were obtained from the Governor of Madras in June 1862. The season was very unfavourable, and all died in transit except two. These lived for a short time, but soon shared the same fate. The next two cases were imported in February 1863. The weather was cold, and through the assistance of Drs. Anderson and Jameson, whose gardeners took care of the plants *en route*, the one from Ootacamund to Calcutta, and the other from Calcutta to Saharanpoor, I was more successful. About two-thirds of these plants arrived safely at Kangra. The next two cases imported were kindly brought round from Madras for me by the Honourable Mr. Harington in August of the same year; but they all died in transit.

3. The failure in transporting the plants imported in June 1862 and August 1863, was due, no doubt, to the extreme heat of the weather, and though no European gardener went in charge of them, I doubt if any care would make it safe to transport Chinchonas such a journey, at that season of the year. It should not therefore be attempted.

Difficulties of man-
agement.

4. About 30 plants of those imported in February 1863, however, were reported to be alive and healthy, and this number would have sufficed to commence the experiment had I had the means of giving it a trial. I asked for the services of Mr. Taylor, a landscape gardener employed by the local committee of Jullundhur, for six months; but though the Lieutenant Governor consented, the committee were unable to accede to my request; and I hesitated to go to the expense of importing a gardener from England until I had more certain proof that Chinchonas would grow in a latitude so far north of their natural habitat, as the Kangra Valley. I had, therefore, to rest content with a native gardener and the promise of an occasional visit from Mr. Taylor, who I appointed superintendent. But differences, unfortunately, almost immediately arose between him and the local authorities, which resulted in his abandoning the experiment to the native gardener, and returning to Jullundhur, leaving his frames and cases at one of the Nassau Tea Company's estates, and his plants planted out in the open forest five miles off. In September 1863, Mr. Taylor returned to the plantation, and cleared a few acres of land round and about the plants,

plants, and erected propagating pits and a hothouse; and in October of the same year I myself visited the place, with the view of showing it to the Governor General, the late Lord Elgin. I found 12 plants alive and tolerably healthy, and as they had been planted in the open and left wholly to nature, I thought it a hopeful sign of future success. I was obliged, however, very shortly to return to Calcutta. At the same time also Mr. Taylor proceeded to Jullundhur, the 12 plants being left to weather the cold as they had the hot season, uncared for, except by a lazy native gardener.

5. Success under such circumstances would have been miraculous, and this I very early foresaw; but a proposition was before the Lieutenant Governor to experiment with Chinchonas on Government account, and much time and temper was lost in discussing whether Government should support my experiment, or import plants from Madras in quantities, and distribute them to the public, native and European, at half their cost. This I strongly objected to, as unjust to myself, and as an unscientific mode of initiating an important national experiment; and in my letter to your predecessor's address of September 1863, on this latter point, I thus expressed myself:

"To effect this, it appears to me that, firstly, I should have at least 150 acres of land at my disposal. Dr. Anderson's nurseries, alone, now cover about 15 acres; but when we came to planting out, which is the only true test of climate, much larger space is required, and for this purpose a forest of between 7,000 and 8,000 acres have been made over to him. What quantity of land Mr. McIvor has I do not know; but I believe he planted out 500 acres this year. Secondly, a skilful gardener specially qualified for directing the experiment, should be obtained this cold season from England. He should stay a week at Ceylon, and then go on to Madras; and proceed at once to Ootacamund, where he should remain a month, at least, under the instruction of Mr. McIvor, for the purpose of making himself acquainted with Mr. Markham's system, as carried out with such eminent success by that gentleman. He should bring with him from there a fresh supply of strong and healthy plants to Calcutta, which should be at once sent up to Kangra, not later than February 1864. The gardener should then proceed to Darjeeling and remain a fortnight on Dr. Anderson's plantation, to enable him to compare the results of the different treatment of both these experiments, and from thence, about the latter end of March, he should proceed to Kangra. By such an arrangement, the Punjab experiment would gain the benefit of all the experience already obtainable in India, in the prosecution of this highly important experiment."

6. The course above sketched, excepting the visit to Darjeeling, was strictly carried out by me. An excellent gardener, Mr. John McKay, who had been employed by the Dukes of Buccleuch and Sutherland, was engaged for me by Professor Balfour of Edinburgh. He left England early in November 1863, and after staying 10 days at the Chinchona plantations of Ceylon, and three weeks with Mr. McIvor, at Ootacamund, he arrived here by the last steamer, in January 1864, bringing with him five Wardian cases of plants, one from Ceylon, and four from Madras.* The plants from Ceylon were the finest I had seen come round here, being from 12 to 13 inches in height, with large succulent leaves; yet not having come round the whole way with Mr. McKay, half of them died for want of proper shading on the voyage. But this misfortune was not a source of regret, as it prevented my making the mistake of sending Mr. McKay to Darjeeling, instead of direct to Kangra, in charge of his plants. With the exception of one case said to contain 316 *Condaminea* seedlings, which having barely rooted, were hardly fit to be transported such a journey, and another which met with an accident, all the Madras plants were in splendid order, and when they reached Calcutta, were growing vigorously. Mr. McKay's difficulties, however, had yet barely commenced. He had to carry his plants from Calcutta to Hoshiarpoor, a distance of about 1,300 miles, and from thence, over three ranges of hills, to the foot of the snowy peaks of the Himalayas. For about 400 miles of this distance, moreover, the plants had to be carried in rough bullock carts, and for the last 100 miles through the hills by coolies. Some of the cases were large and very heavy, and many times the coolies threw them down, declaring their inability to

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		* From
24	C. succirub	From
150	C. succirub	
316	C. Condam	seedlin
		an inc
14	C. micranth	
2	C. Calisaya	
4	C. Peruvian	
TOTAL	- 486	Plants.

proceed further. By patience and perseverance, however, they succeeded, and on the 1st March 1864, Mr. McKay, with the five Wardian cases, reached his destination.

7. The following Table shows the result of his journey as regards the plants he had charge of—

NAMES.	Packed in Cases.	Reached Alive.	Died.	REMARKS.
<i>C. succirubra</i> - -	150	117	33	* These all died before reaching Calcutta, as explained above.
<i>C. succirubra</i> (Ceylon) -	24	12	12*	
<i>C. Calisaya</i> - - -	2	2	—	
<i>C. Peruviana</i> - - -	4	4	—	
<i>C. micrantha</i> - - -	14	11	2	
<i>C. Condaminea</i> - - -	316	67	249†	† All seedlings.
TOTAL - - -	510	213	296	

Arrival at New
Quito.

8. On reaching New Quito, Mr. McKay found but six of the old plants and nine *C. Pahudiana* seedlings alive; and, as these he set aside, and I afterwards gave them to Mr. Taylor, the experiment may be said to have commenced on the 1st March 1864, with the 213 plants which then reached the plantation alive.

Difficulties of
climate.

9. After allowing the plants to remain in the cases for a little time to recover from the effects of their long journey, he planted most of them out in nursery beds: but in 10 or 12 days they were attacked at the roots by a species of large red ant, which killed a few of them and greatly retarded the growth of others. This compelled him to lift the whole and re-pot them, and soon afterwards the weather became so cold and stormy, and the plants suffered so severely, that by the end of the month there was hardly a leaf left upon one of them. Mr. McKay began to lose heart, but he did not despair: he carefully cleansed and pruned his plants, kept them in a close moist atmosphere, on a bottom heat of 70 Fahr., and on the sixth day he had the satisfaction to find them beginning to shoot, and in a month his plants were again green, fresh, and growing vigorously.

10. On the 19th of March, by my instructions, eight of the strongest and most healthy plants of *C. succirubra* were planted out in the open air, without any protection from the weather. These were also destined to experience rough treatment. They had hardly been 10 days in the ground before rain set in with unusual severity. Day after day, and night after night, it rained almost incessantly, until the soil became so saturated with moisture that the roots of the plants began to show symptoms of rot. Charcoal was put thickly about the roots to preserve them, and the rain abating the plants were saved; but they had no sooner rallied a little, than the valley was visited by a series of hailstorms so severe that very serious damage was done to the tea plantations in the neighbourhood, and indeed to all vegetation in the valley, while every leaf was stripped off the eight unfortunate Chinchona plants which had been planted out in the open. These trials were disheartening in the highest degree; nor were they destined yet to cease. The natural consequence of the overfall of rain during the months of March and April was that, although ordinarily few months in the year pass at Kangra without some rain, not a drop fell during half the month of May and the whole month of June. The heat was excessive, and about the middle of June became so intense, that it was found impossible to keep the temperature below 90° in the cases. This caused the plants generally to droop, and the leaves of *C. micrantha* and *C. Peruviana* to turn yellow and to drop off. The aspect of affairs was dim and discouraging, and had the drought continued very much longer it would, no doubt, have given rise to serious apprehensions for the success of the experiment. But the beginning of July ushered in the long-

looked-

looked-for rain-clouds, whose refreshing showers imparting new life and strength to the drooping plants, they soon assumed their natural and peculiarly beautiful green and fresh appearance; *C. micrantha* and *C. Peruviana* began to put forth new leaves; and all the plants to grow more vigorously than they had ever done before.

11. Nor was climate the only difficulty I had to contend with. Up to the present, to the few acres of land on which I had erected my propagating pits and glass houses, and laid out nurseries, I had no title, nor could I by any means obtain an acre of land to rent or to buy from Government or from any one else. The natives were averse to Europeans obtaining a footing in the valley, and I almost despaired of getting sufficient land to make even an experimental plantation, when at this juncture the Lieutenant Governor came to my aid and granted me 100 acres of the Government reserves, at the average cost of the auction sales of the year.*

12. In December 1863, through the kind favour of Her Majesty's Consul at Batavia, I received 100 seeds of *Chinchona Calisaya* from the Dutch Government of Java. These I had to keep till Mr. McKay arrived. I put 75 in a stoppered and sealed bottle, and the remainder I kept loose in a paper envelope. Hermetically sealing seeds was an experiment which most people whom I consulted were of opinion would fail; but it would seem to have answered well, as of the seeds so treated 31, or nearly one-half germinated, while of the others nine, or little over one-third, germinated. The plants from the former, moreover, are reported to be far better plants than those from the latter. The first were sown on the 20th and the latter on the 26th March. The bottled seeds began to germinate on the 11th day, and the others not till the 17th or 18th day. Of the seeds of this species sent, at the same time, to the Government plantation at Darjeeling, viz., 200, only nine, or $4\frac{1}{2}$ per cent. germinated; of 100 seeds sent to the Darjeeling Chinchona Association none germinated; while at Kangra 40 per cent. were obtained. The result is worth recording, equally as regards the packing of seeds, and as being highly creditable to Mr. McKay. In May last, Mr. Clements Markham very kindly sent me 104 seeds of *C. Pitayensis*, which had been collected in New Granada in August 1863 by Mr. Cross, and subsequently a few more of the same batch of seeds were generously presented to me, from his own allowance, by Mr. McIvor. They were at once forwarded to New Quito, but none of them germinated. The same result was obtained by Mr. McIvor and Dr. Anderson, so it may be assumed that these seeds, having been nearly a year out of the ground, they had lost their power of germination. For my experiment the failure of these seeds is peculiarly unfortunate, for, besides some *Pitayo* barks being commercially as valuable as the best red bark, as this species of Chinchona grows at an altitude of from 7,000 to 8,000 feet, it would probably be very suitable for localities in the high latitudes of the Punjab. The seedlings grown from the 40 *Calisaya* seeds which germinated are now strong and healthy plants, after having given 170 per cent. of cuttings.

13. Since July last, nothing having occurred to interrupt the progress of the experiment, the plants have been growing steadily; and, considering the very limited number of stock plants on the plantation, and the length of the winter at Kangra, propagation has been going on rapidly. The growth of the eight plants planted out, though it has been regular, has not been equal, owing, probably, to all the plants not having been of equal strength when first planted out. One plant, No. 4, was crushed by the fall of a tree, and supposed to be completely annihilated; but after two or three months the roots threw out fresh shoots, and it is now a healthy plant again.

14. The following Table shows the growth of these plants from the 19th March, the date on which they were planted out, to the 19th of December, by which it will be seen that four have attained a height of 2 feet, 2 feet 2 inches, 2 feet 8 inches, and 3 feet:—

	Height in Inches on the 19th March.	April.	May.	June.	July.	August.	September.	October.	November.	Growth in December.
1	12½	—	13½	14	14½	14¾	15½	16	16½	0
2	12	—	12½	13	15	17	21	23	24	·75
3	13	—	13¾	15¼	17	20	27½	29¾	32¼	·25
4	8½	—	8½	—	—	—	—	4	4½	0
5	15½	—	16½	17	20	24½	31½	33	35¾	·42
6	11½	—	12½	14	15½	18	19	20	21	·25
7	9	—	9½	10	11	12¾	16	18	18¾	0
8	14	—	15	16	17	17½	23	25	26	·75

15. The growth of the plants was most active during the months of August and September; in the month of November it was fair average, and almost ceased in December. In January, February, and March, the plants have not grown at all, so we may set down eight as the number of growing months, at an elevation of 4,500 feet in the Kangra Valley, and the average growth of strong and healthy plants in their second year, probably, at two inches a month.

crease by propaga-
on.

16. The rate at which propagation has been going on is shown in the following Table, and I would call attention to the extraordinary increase of *C. succirubra*, which is admitted to be the species most difficult of propagation, being nearly 2,500 per cent. A rate of increase of nearly 2,000 per cent. was attained by Dr. Anderson with *C. Condaminea*, but in his second year, his rate of increase with *C. succirubra* for the same period being a little short of 500 per cent. It might have been considerably accelerated at Kangra; but the plants that are to be planted out next rains have not been touched for some time in order to increase their strength and vigour:—

	March 1864.	April.	May.	June.	July.	August.	September.	October.	November.	December.	January 1865.	February.	March.
<i>C. succirubra</i> - -	129	192	304	447	641	929	1,293	1,486	1,664	2,025	2,223	2,463	2,793
<i>C. Calisaya</i> - -	2	20	19	60	60	60	58	58	61	73	84	96	118
<i>C. Condaminea</i> - -	67	149	215	273	379	481	629	727	807	934	1,044	1,132	1,262
<i>C. micrantha</i> - -	11	29	37	48	60	64	68	68	70	75	75	75	75
<i>C. Peruviana</i> - -	4	13	23	29	40	42	46	44	44	49	49	49	49
TOTAL - - -	213	403	598	837	1,180	1,576	2,094	2,383	2,636	3,156	3,475	3,815	4,297

xperiments in
anting out.

17. Early in November I directed Mr. McKay to plant in the open air some *C. Condaminea* plants, as the severity of the winter months at Kangra was the test of climate most to be dreaded in the Kangra Valley. Mr. McKay objected that it was too late in the season, fearing that as the plants had not been "hardened off," so sudden a change of temperature as from 80° to 50° Fahr., would be too great to subject them to. He, however, planted out 25 plants on the 23d November. This was many more than I had intended, as one-fourth of the number would have equally well sufficed for an experiment, of which he had so little hope that in reporting upon it, he said, "I actually thought they would all die." They did not die, however, nor suffer in the slightest, and these plants have now again commenced to grow. Three healthy young plants, of about five inches in height, one of *C. micrantha*, and two of *C. Calisaya*, were similarly planted

planted permanently in the open air on the 6th of February, and up to date they are reported to be looking promisingly.

18. Thus of the 36 plants planted in the open, not one has perished from either the effects of the climate nor from any other cause, the only ill effects of the cold observed being that the frost burnt the tips of some of the old leaves of the eight *Succirubra Chinchonas*; but this did the plants no harm. Mr. McKay, however, reports the occurrence of an atmospheric phenomenon on the 1st February last, which is worthy of note, and as it is very curious I give it in his own words: "A fearful thunder and hail-storm passed over the valley on the 1st instant. It continued for about half-an-hour. There must have been something injurious to vegetation in the atmosphere at the time, as some of the leaves of my Chinchona plants (under glass) turned quite black. They were quite green an hour previous."*

Results

19. Appended to this Report will be found some meteorological observations; but I regret to say that they are not so complete as I could wish. The instruments for observation were, on my requisition, *at once* placed at my disposal by his Excellency the Governor General, but they did not reach Mr. McKay till late in the season, and the barometer being one which he was not accustomed to, he was some time in making himself acquainted with its use. Early in December, too, his maximum and minimum self-registering thermometers met with an accident and were broken, and those despatched from Calcutta to replace them, were sent by the Transport Company to Kooloo, and he has not yet received them. Mr. McKay has taken very great and praiseworthy pains to carry out my instructions in respect of these observations, which, *if accurately taken*, will undoubtedly be of the highest scientific interest; and next year it is hoped that better success will attend his efforts in this very important part of the experiment.†

Meteor
servati

20. The propagating pit being now overcrowded, 300 young *C. succirubra* plants were planted in nursery beds early in March last, and up to date they are reported to be doing well.

Remov
nursery

21. Of buildings there are now at New Quito a propagating house 50 feet by 10 feet, with flues for artificial heat; a greenhouse 20 feet by 10 feet, which will be enlarged this year, and used as a propagating pit also; a comfortable dwelling-house, with three inner rooms, 14 feet square, and three verandah rooms, 10 feet square; a godown 50 feet by 10 feet, which can be converted into a propagating pit if required; barracks for 50 coolies, besides stables, cow-houses for collecting manure, servants' houses, &c., &c. All of these buildings, except the last-mentioned, are of stone masonry, glazed and slated, and will suffice for the plantation for several years.

Buildi

22. In December last his Honour, the late Lieutenant Governor, visited and inspected the plantation, and in a private letter to me he expressed himself well pleased with all he saw at New Quito. He had some doubts, however, as to the suitability of the site selected for the plantation, and suggested the advisability of trying experiments with the plants at different altitudes. I consequently at once instructed Mr. McKay to leave a few plants in pots with some of the tea planters, whose plantations were variously situated; but he was unwilling to trust his valuable plants out of his sight, lest they should be neglected or stolen (in which, perhaps, he was right), and the difficulty of getting more land in the neighbourhood of the plantation prevents me from at present doing much towards following out his Honour's suggestion. I hope, however, with the help of the present Deputy Commissioner, who has paid great attention to horticulture, and who himself takes a very lively interest in this cultivation, to be more successful by-and-bye.

Visit of
the Lie
Govern

23. And here I may take the opportunity of expressing my obligations to Sir Robert Montgomery; first, for the interest he has throughout expressed in the success of my experiment; secondly, for permitting me to obtain 100 acres of the Government reserved land at the average cost of the auction sales held in the valley;

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* Colonel Gastrell, Boundary Commissioner of Bengal, has drawn my attention to a somewhat similar phenomenon, which is mentioned in Mr. Thos. Hopkins' book on winds and storms, as having occurred in Lombardy. In the midst of summer, a cold wind swept down from the Alps and through the valley, depriving the leaves of all the vegetables of their moisture and turning them quite black, as if burnt to tinder.

† *Vide* Col. Gastrell's letter, with Appendices.

valley; and, thirdly, for liberally sanctioning a grant of 2,000 rupees of public money in aid of the buildings I had erected.

Visit of Major Elphinstone, the Deputy Commissioner.

24. In the early part of this month, the Deputy Commissioner made a tour in the direction of Holta; on the 8th instant he visited New Quito, and on the 9th he wrote to me as follows:—"I visited all the plantations in company with Captain Duff, who showed me everything he could. Mr. McKay was very civil, and seems to get on famously. Nothing could be healthier or more promising than his plants, and the large ones, which had remained out during the winter, were making vigorous shoots, and will be six feet high this year. There is no doubt, in fact, that Chinchonas will get on capitally at Kangra, though they require very delicate treatment at first."

Reasons for prolixity.

25. The foregoing remarks embody the history, if I may so call it, of the first Chinchona plantation established in the Punjab during the first year of its existence, and I trust that the very great national importance of this experiment, will be deemed a sufficient excuse for my having dwelt at some length on the subject. It may, perhaps, be thought that in some respects I have entered somewhat too much into detail; but I have done so advisedly. From a perusal of those paragraphs of this report in which I have described the very great difficulties the young plants had to do battle with, first with red ants, then with rain-torrents, then with violent and tempestuous hail-storms, then with severe drought and the burning sun of a tropical climate, and finally with the bitter cold winds and sharp frosts of a sub-alpine region, it might be assumed that the Kangra Valley is in no way a suitable locality for attempting the cultivation of Chinchonas. But I do not take this view of the case. The conclusion I arrive at from a review of these facts is one far more encouraging to me and Government, viz., that the Chinchona plants which were permanently planted out in the open air, *C. succirubra* and *C. Condaminea*, having passed through these very severe tests of climate, unchecked and unharmed, and being now healthy, vigorous, and growing plants, these two highly valuable species, at least, are far more hardy than was at first anticipated, and that the results of this experiment, so far, give good promise that ultimately they may be successfully cultivated in very many localities on the slopes of the Himalayas, not as exotics or hothouse plants, but as garden shrubs and forest trees.

Results of the experiment.

26. Hitherto an equable temperature has been considered, above everything, essential to the success of all Chinchona cultivation, but it will be seen from the tables annexed that the variation in temperature at New Quito is extremely great, and that in the midst of winter (the 23d of November last) twenty-five young plants of *C. Condaminea* were suddenly, and without any preparation whatever, removed from a glass house at a temperature of 80° Fahr. to the open air at a temperature of 50° Fahr.; and on the 6th of February one of *C. micrantha* and two of *C. Calisaya* were similarly treated without suffering in the slightest degree from the extreme change. "Up to date," says my superintendent in a late report (1st April), "they are looking most satisfactory and promising." The plants could hardly have been submitted to a severer test, and the result, I venture to think, is the very strongest proof of the hardiness of these plants, when well-cared for and properly treated. Hitherto, again, it has been supposed that an extraordinary rain-fall was necessary to the luxuriant growth of all Chinchonas; but it would seem that excess of moisture, with *C. succirubra* at least (unless perhaps in very friable or granular soils and remarkably well-drained localities) is as much, if not more, to be feared than excess of drought. This peculiarity has been noticed also by Mr. Melvor, so it may be considered established, I think, that if Chinchonas grow most luxuriantly in regions subject to the influence of a full discharge of tropical rain, they are extremely sensitive of an excess of moisture at the roots, and consequently require a free and open soil and a well-drained locality. And to this point attention is especially necessary, for the fact is at once suggestive of the proper mode of treating seeds and very young seedlings, viz., the moistening of the soil rather by the indirect process of evaporation than by the more direct process of the syringe. More Chinchona plants, I venture to think, have been killed by injudicious watering than by any other means.

Climates suitable for *C. succirubra*.

27. Again, though determined to give all the valuable species of Chinchonas trial at Kangra, I must confess that I was not sanguine of success with *C. succirubra*.

rubra. In the Chinchona regions of South America, this species is found only within two or three degrees of the equator, and there, according to Mr. Markham, frequently, if not generally, at elevations below 5,000 feet, while the "New Quito" of the Kangra Valley, though not above 4,500 feet in altitude, is in latitude $32^{\circ} 7' 8''$. The appearance of the plant itself, moreover, with its very large, succulent, and bright green leaves, is suggestive of tropical affinities. I was prepared, therefore, from the first, for doubtful success, if not positive failure, with this most valuable species, resting my hopes almost entirely on *C. Condaminea*, to which species I thought the climate of the Kangra Valley, if suitable for any species of Chinchona, would ultimately prove the most congenial. And in this opinion I was confirmed by my superintendent, who at first reported that he found *C. succirubra* the most difficult to propagate, and *C. Condaminea* the easiest. But in those days he used to lose ten per cent. of his cuttings, while in these days he does not lose one per cent., and from his last weekly report I make the following extract:—"All my plants and cuttings are in a flourishing state and look promising, particularly *C. succirubra* and *C. Condaminea*. The former, I am happy to state, much more so than I at first anticipated; but I think now it will turn out to be the most valuable species we have at New Quito." I am still of opinion from the general appearance of the plant, and from the condition of all the Chinchonas I myself saw at New Quito, that *C. Condaminea* will eventually prove a more hardy plant than *C. succirubra*; but it is certainly most encouraging and most gratifying to find the latter species, the bark of which is commercially so much more valuable than that of any of the other species of Chinchona, and which, from its greater size, must be so much more profitable to cultivate, affording such very fair promise of being successfully acclimatized in a region so very remote, and in a latitude so far north of its natural habitat as the Kangra Valley.

28. As regards the site of "New Quito," as mentioned above, the late Lieutenant Governor thought a better one might be selected; but experience has not shown, I think, the present site to be objectionable. The beginning of the season of 1864 was quite exceptional; and all the tea plantations which are situated in the open plain suffered quite as severely as my Chinchona plantation, which is situated in an enclosed and very lovely dell. The following description, by Boussingault, of the climate of Riobamba, says Mr. Howard, under the head of *C. succirubra*, in his *Nueva Quinologia de Pávon*, will therefore illustrate the requirements of the vegetation of the species, and these details may not be without their use in connection with the present attempt to localize the *Chinchona* in mountain ranges in India.* Riobamba itself is situated in an arid plain, surrounded by a grand amphitheatre of snow-clad mountains, amongst which the names of Tunguragua and Chimborazo are most familiar to Europeans. This vast amphitheatre of snows, which circumscribes the horizon of Riobamba, offers continual opportunity for the most varied observations. It is curious to notice the aspect of those snowy summits at different hours of the day, and to see their apparent height vary from one moment to another through the atmospherical refractions. With what interest do we not observe, in so limited a space, the production of all the grand phenomena of meteorology! Here an immense horizontal cloud, of those which De Saussure has defined with so much exactness under the name of parasites, girds the middle of one of those elevated trachyte cones, and keeps its position without dispersing through the violence of the winds. In a little time the lightning darts from this mass of vapour, the hail and rain inundate the base of the mountain, whilst the snowy summit, inaccessible to the tempest, is illuminated by the sun. In another part is seen a cupola resplendent with ice, whose projection on the deep azure of Heaven permits us to distinguish its most delicate outlines. The atmosphere appears pure, transparent as the most diaphanous crystal, when, beholding attentively, we suddenly perceive that this snowy peak is becoming covered with a cloud in the form of a light veil, which seems to emanate from its bosom, as if it discharged smoke. This cloud has not completed its formation when it disappears, to reproduce itself immediately, and again to vanish. Such an intermittent formation of cloud is a phenomenon very frequent in the snowy sierras, and is particularly observed

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* Geografía del Ecuador, p. 321.

in the fine season, and always some hours after the culmination of the sun. In these circumstances the snowy mountains may be compared to condensers, elevated towards the higher regions of the atmosphere to renew freshness and dryness to the air, and thus in this manner is restored to the superficies of the earth the water which had been diffused through the atmosphere in the form of vapours.

"These plains, surrounded by snowy mountains, present the most lugubrious aspect when a constant wind brings moist air from the warm region. Then the mountains cease to be visible, and the horizon is covered with clouds, which appear to touch the earth. The weather continues cold and damp, since the rays of the sun cannot penetrate the thick mass of vapours, so that there is nothing but a continuous twilight, the only one which is known in the tropics, since in the equatorial region night succeeds suddenly to day, and the sun appears to be extinguished in its setting."

29. Now we have, at New Quito, if not all, many of the features of climate and scenery here depicted. We have the amphitheatre, though on a smaller scale; the snow-clad mountains of the great Chumba, a range of the Himalayas perhaps little inferior to the ranges of the Andes in the immediate neighbourhood of Riobamba; and we have all those grand phenomena of meteorology which so interested and delighted M. Boussingault, in common with the great Humboldt, and many other scientific travellers. In addition, we have a hill torrent dashing through the very centre of the plantation, forming countless cascades as it leaps over massive boulders some 15 or 20 feet high, impregnating the atmosphere around with the moisture of its spray, and effectually draining the surrounding slopes throughout the period of the rains. It will be seen also, by the above extract, that this species of *Chinchona* in its natural home is no stranger to those torrents of rain, and terrific storms of thunder, lightning, and hail-stones, with which the Kangra Valley is sometimes visited, and which are indeed incident to all regions in close proximity to perpetual snows, and in India to many others far removed from them,* so that they need not give occasion to serious alarms. It is true that Mr. Spruce thinks that Mr. Howard was misled by M. Villavicencio in recommending a climate like Riobamba for the cultivation of *C. succirubra*; which, he says, requires a warmer atmosphere; but the broad facts remain, that eight plants of this species withstood the severest season we have had at Kangra for many years, and are now flourishing young trees, and that the stock has been increased by propagation at the rate of nearly 2,500 per cent. in 10 or 12 months, which go a good long way to confirm the opinion of this eminent authority. Of *C. Condaminea* Humboldt says, that it is exposed to a mean temperature of 15° to 16° Réaumur, or 5° to 6° Fabr. higher than *C. succirubra*. It would certainly be desirous to experiment with the several species of *Chinchona* at different elevations, and a few plants of both species have already been placed out some 500 or 600 feet higher than the present garden, to whose progress careful attention will be paid. *C. Condaminea* will, I doubt not, flourish at higher elevations still; but with *C. succirubra* I am disposed to go lower instead of higher, and am not prepared at present to risk many of my plants by approaching nearer the regions of severe frost than the present site.

Propagation by cuttings.

30. And, as experiment, judiciously and carefully carried out, should be one of the first objects of every superintendent in the present stage of the cultivation of *Chinchonas*, I may here allude to a point which has had some influence on the propagation of plants in Java, and which does not appear to be yet quite settled, viz., the best mode of taking cuttings from *Chinchona* plants. The slips from which Mr. Junghuhn propagated his plants, to use his own words, were "twigs cut close under the leaf-knobs, which should not be of greater length than, as a maximum, half a foot." He admitted, however, his coadjutor, Dr. de Vry, says, "that such slips produced plants that could not withstand any baneful external influence;" and the Doctor adds, "it is a pity that after so well founded an observation he did not proceed to discover the cause of such a fact by making certain experiments, for had he done so, he

* One tea plantation, I am aware of in Cachar, was literally so cut to pieces by a hail-storm last year that it produces little or no tea.

he would certainly have discovered, as Mr. McIvor did, that his slips were too large, and that the increase of quinine plants can be, *par excellence*, effected by means of slips, provided the latter are taken as small as possible." Mr. McIvor, as stated by Dr. de Vry, has adopted the latter method, and with the greatest success. Mr. McKay has tried both methods, and his experience is the same as that of Mr. McIvor on this point. He says, "the wood best adapted for cuttings are young tender shoots, one-half to three-fourths of an inch in length, with stems of about an eighth of an inch in diameter. Cuttings of this sort form roots much quicker, and are less liable to damp and rot than large succulent cuttings." Dr. Anderson, up to the present, has adopted the same system of propagation; but he has apparently arrived at an opposite conclusion, as from his report for the month of January last, I observe that he does not mean to continue it after he has attained 20,000, or a propagating stock, of each species. "These stock plants," he remarks, "will be allowed to grow for some time before cuttings are taken from them to form bark-yielding plants as I am convinced that it is better to wait a short time for vigorous shoots than to swell up the monthly return by weak, ill-formed cuttings, whose slowness of growth will never be compensated by their number."

31. It is very desirable to ascertain if the opinion on this important point, expressed by Dr. Anderson in the last sentence of his remarks here quoted, will be borne out by experience, and I have, therefore, instructed Mr. McKay, while pursuing his own system, to ascertain the fact by actual experiment with one or two plants.

32. In my Report of July last I said that I hoped to plant out 30 acres of Chinchonas this year; but the results of the chemical analysis made by Mr. Howard and Dr. de Vry on the bark of young Chinchona plants last year* have satisfied most people that, if ultimately Chinchona will be grown in forests, the proper method at present to adopt is to grow them in gardens as tea plants are now grown in Assam and at Kangra. An early yield will thus be obtained, which will enable private persons and joint stock companies to undertake the cultivation as a highly profitable speculation. To do this, however, on an extended scale will require many hundred thousands of plants, and necessitate the superintendent devoting all his energies, for this year at least, to propagation, which has unfortunately already been checked by preparing some plants to plant out two or three acres. Dr. de Vry, I observe, objects to the propagation of Chinchona by seeds, and finds fault with the late Mr. Junghuhn for doing so in Java, instead of propagating by slips, to which method, he says, a preference was given over seeds by Mr. McIvor; but here Dr. de Vry has certainly fallen into error, for Mr. McIvor did not propagate by slips, I apprehend, from choice, but rather of necessity, and if Mr. Junghuhn made a mistake in propagating from seeds it was a mistake which Mr. McIvor has been doing all in his power to place himself in a position to repeat, and which I should most gladly follow had I the means. But the first year's flowers with Mr. Junghuhn, and the first and second year's flowers with Mr. McIvor, I believe, withered away without giving any result, and I am not aware that seeds of any species of Chinchona have yet been produced in India. The mistake Mr. Junghuhn made, I think, was not in propagating from seeds which, as soon as they can be obtained in quantity, must, of necessity, supersede slips, but in the tenacity with which, to the neglect of *C. Calisaya* and *C. succirubra*, he persisted in extending the cultivation of *C. Pahudiana* beyond all limits, after he had been assured, on the very highest authority, that that species, if not altogether worthless, was the next thing to it; and in wasting his valuable time in controversial attempts to support an opinion with chemical analysis had already demonstrated to the public was erroneous. Nor is it, in the case of Dr. Junghuhn or Chinchona cultivation alone, that practical results have been marred from the necessity of supporting a theory or opinion once advanced or denied by a man of science. The progress of tea cultivation in India was arrested and thrown back at least 10 years by the same cause a quarter of a century ago. It is their liability to such misfortunes wherein lies one of the greatest weaknesses of experiments of this nature when undertaken by governments; it is its absence which constitutes in a great

Chemical analysis
of Howard and
Vry.

* Vide Pharmaceutical Journal, June, July, August 1864; also Revue des Deux Mondes for the Colonies.

great measure their greater strength when undertaken and carried out by private enterprise. I think, therefore, that the very highest praise is due to Mr. McKay, not for filling hothouses and nursery beds with millions of seedlings which he can neither use nor sell, but for having left the beaten track, and by endeavouring to prove to the public that Chinchona plantations may, within reasonable time, yield a very large return to the capital expended upon them, thus stimulate the cultivation of these valuable plants by private enterprise.

Tea.

33. In addition to his Chinchonas Mr. McKay planted last season five maunds of tea seed, and besides fencing in all his beds, and demarcating his boundaries with thick-set hedges of tea, he will prepare an experimental garden of this plant, the cultivation of which, I venture to think, has by no means reached the highest practicable stage of development. He has already made some experiments both in sowing and planting, and is satisfied with them; but more definite results are necessary before reporting upon them.

Nurseries of other plants.

34. He is further making a nursery of all the plants and trees in the neighbouring hills, and reports that he has already about 1,000 plants in it, and this nursery I hope to improve by obtaining for it some valuable forest trees from Australia and South America. Some seeds of a rare species of melon, which Mr. McKay brought with him from the Duke of Buccleuch's, were sown last year, but the plants were all destroyed by a violent hail-storm. Some strawberries also of a fine kind were planted, but I have no report of the result. His Chinchona nurseries he is shading by a trellis work to be covered with vines, which, as admitting more air and sun light, will be a better shade than grass *chuppers*. The vine grows wild at New Quito, and when up there I brought down a specimen of the wood, which is now in the Botanical Gardens of Calcutta, as thick as my arm. It is also to be seen growing luxuriantly in the Government garden, but I was told that the fruit never comes to maturity, being always destroyed by the heavy rains. I shall watch, therefore, this and the other experiments which are in progress at New Quito with interest. The climate of the Kangra Valley is very peculiar; there may be seen the fruits, flowers, shrubs and trees of many and far apart climes flourishing in close proximity, and I am confident that many others, that would be highly appreciated by the people, could be easily introduced and naturalised were a little care and attention paid to their cultivation. The mulberry is already to be found along the borders of the Government tea plantation, and I have instructed Mr. McKay to grow it largely, with the view, when Chinchona cultivation is far enough advanced to allow of leisure for attending to it, to introduce the silk-worm. I observe it stated that the plant will not flourish at Holta, that insects destroy it; but I am not so advised from the place itself.

Extension.

35. I observe, the late Lieutenant Governor, in recording a minute on his visit to New Quito, calls it a "small experimental plantation of Chinchona," on a "small piece of land." I have as yet little land, and this may prevent me from extending the cultivation when I am prepared for it; but for the rest everything, if I am rightly informed, is comparatively more forward than at the Government plantation at Darjeeling, which has been established a year longer. The cultivation at Darjeeling was commenced, on the 15th June 1863, with 211 plants of all species, and on the 1st of April 338 more were received, making a total of 549 imported plants to work upon. On the 15th June 1864, or at the expiration of the first year, this number had been increased to 2,545. The Kangra experiment was commenced, on the 15th March 1864, with 213 plants of all species, and on the 31st of March 1865, or at the expiration of the first year, Mr. McKay had 4,297 plants of all species, and might have had twice, if not thrice, the number, had he not set aside some of his plants for planting out.

36. In every respect I have reason to be satisfied with Mr. McKay, who has, under many difficulties, not only discharged his duties with attention and the strictest integrity, but has evinced an intelligent and lively interest in the success of the important experiment he has been entrusted with.

Conclusion.

37. I cannot conclude this, my first annual report, without expressing my deep sense of the encouragement and support given to me by Her Majesty's Secretary of State, Sir Charles Wood, in the frequent mention he has made of my

my struggling experiment in several public despatches, and for the numerous works on Chinchonas, including Mr. Howard's beautiful *Nueva Quinologia de Pavon*, which he has from time to time directed to be forwarded to me.

To Mr. Clements Markham also I am under the very greatest obligations. From the first he has taken the warmest and most lively interest in the success of this experiment, and it is mainly due to the encouraging letters I have received from him that I was induced to persevere with the cultivation up to the point it has attained, through the many obstacles I have had to contend with.

I have the honour to be, &c.

(signed) *W. Nassau Lees*, Captain,
Chinchona Planter.

APPENDIX.

REMARKS on the Propagation of Chinchonæ by Mr. *John McKay*, Superintendent of Capt. *W. Nassau Lees'* Plantation, "New Quito."

I NOW beg to submit a few practical remarks on the propagation and cultivation of the Chinchona plant, which, I trust, will prove interesting to you; but, as my experience in the cultivation of these valuable plants has only been for 12 months, I acknowledge that I have much to learn yet, and therefore I do not presume to give in these remarks a complete guide to the requirements necessary for the proper treatment of this plant in its different stages of growth.

When I commenced the experiment here, the loss in cuttings amounted to 10 per cent., and now I do not lose one per cent.; the great loss at first was owing to my ignorance of the climate.

One plant worthy of notice, with reference to the eight plants of *Chinchona succirubra*, which were planted in the open air in March 1864, is, that the stems of the plants grown since they have been planted here are considerably thicker in proportion than the old stems, and their leaves are much larger and more succulent than the old ones. This I conclude to be a striking proof of the suitability of the climate for the cultivation of the Chinchona plant; but if this estate had been a little more distant from the snowy ranges of the Himalaya Mountains, the increase by propagation would be much more than what it has been. My proximity to the snow is doubtless a great hindrance to propagation in winter, as the climate here is greatly influenced by the snowy ranges; and hail-storms, which are the only adversaries that the Chinchonas will have to contend with here, are very destructive to all vegetation during the months of February and March.

I have now commenced to line out the land and make pits for the reception of the plants that will be planted in the rains. I have terraced about half an acre, as I want to see whether the plants will make better progress in the terraced lands than in the land as it naturally is.

In collecting cuttings great care should be taken to placing them in a moist, shaded place, until they are ready to be put into the pots; a flower-pot, with damp moss in the bottom, is the best way to keep them. The wood best adapted for cuttings are young tender shoots, one-half to three-fourths of an inch in length, with stems of about one-eighth of an inch in diameter. Cuttings of this sort form roots much sooner, and are less liable to damp and rot, than large succulent cuttings; in preparing them for the pots they should be carefully examined, to see that there are no insects on them. To insure success, each cutting, before it is put into the soil, should be pressed firmly three or four times (the cut end) against the side of a new and dry flower-pot, so as to absorb the juice which flows from the wound, and which prevents mildew and rot; the cuttings should be examined carefully, and re-potted into fresh soil every morning until the fifth or sixth, after which time they may be considered on the safe side.

The soil which I have used, and in which I have found the cuttings to root freely, is a compost of three-fourths of sand to one-fourth of pounded bricks, and a sprinkling of leaf mould; but the sand should not be too fine, as the cuttings root more freely in an open soil.

Cuttings should never be put into new pots, because the pots extract and absorb the moisture out of the soil, and, consequently, the cuttings flag or droop, a thing that is very injurious to the cuttings, and should always be prevented if possible; therefore, all new pots should be soaked in water for half an hour, and then be allowed to dry slowly in the shade.

Propagation by cuttings.

To obtain well-rooted plants, it is essential that the pots with the cuttings be placed on a bottom of heat of from 70° to 75° Fahr. in a close moist atmosphere, for a few days, then air should be admitted gradually; they are syringed overhead twice a day, mornings and evenings, and the atmosphere in the propagating house should be always kept moist by syringing the walls and floor.

After the cuttings are well rooted they should be potted off into three-inch pots, in a compost of fine black loam and sand, about equal parts of each, with a sprinkling of fine sifted manure and brick-dust; they are then well watered, and placed in a close warm atmosphere for five or six days, during which time they are syringed mornings and evenings, and carefully shaded during sunshine. After they are established in pots air is admitted freely, and as much light as possible, and carefully watered, but never overhead; the soil in which the plants are growing should always be kept free and open, by turning up the surface with a small pointed stick three or four times a month.

Propagation by buds.

This is no doubt a good system of propagation, as it increases the number of plants more rapidly; but buds require more care and attention than cuttings or seedlings; they also take more time to form roots, and do not grow half so quick as rooted cuttings.

The way in which I prepare the buds is, I allow the plants for that purpose to attain a height of from five to six inches. I then cut them in the centre, close above the joint or node. I then take the point of the shoot for a cutting, and cut the stem between each joint, and split each down the centre. I then press each bud three or four times against the side of a dry flower-pot; they are then placed in the pots, the buds being merely covered with soil; they are then placed in the cases, and treated as cuttings are. It is of great advantage to have the leaves attached to the buds, because they form roots much sooner, and are not so liable to rot.

Propagation by layers.

This is a very slow system of propagating the plants, but a sure way to obtain fine large ones, as the layer is nourished and growing from the parent plant while it is forming roots.

The principle of layering which I adopted is a little different to that generally practised, as I found that when the layer was removed from the parent plant to be potted, it was very much checked by being raised out of the soil. To obviate this, the plants to be layered (if in pots) I plunge in soil up to the rim. I then take a four-inch pot, well drained, and fill it with soil, the same as that used for cuttings, and plunge it half into the soil at a proper distance from the plant to be layered; then the stem of the plant is cut through a joint, and a thin piece of dry brick is put into the slit, and left there for half a minute or so to absorb the juice which flows from the wound; the layer is then carefully bent into the soil in the flower-pot, and then the pot is covered with a small mound of soil, covering the layer with about half an inch of soil above where it has been cut. In placing the layer in the pot care must be taken to keep the two cut parts separate.

After the layers are well rooted, they should be carefully cut from the parent plant, and left in the pots in which they have been layered for two or three weeks, and afterwards they can be re-potted into larger pots, or planted permanently in the open air.

Propagation by seeds.

In March 1864 I received 100 seeds of *Chinchona Calisaya*, 75 of which were hermetically sealed, and 25 put up in paper; of those sealed 31 germinated, while of the latter only nine germinated, and are much inferior to the former. Previous to being sown they were steeped in cold water for six hours; they were then taken out of the water and spread on a dry cloth in a warm moist atmosphere for half an hour; the pots for the seed were half filled with potsherds and covered with moss; they were then filled with a compost of two-thirds of fine sifted leaf mould and one-third of sand; the surface being slightly pressed down and made smooth, the seeds were then sown, and merely covered with the soil used; the pots were then plunged in damp sand, on a bottom heat of from 75° to 80° Fahr., and the seed began to germinate on the 20th day after being sown.

In the treatment of seeds it is of great importance to attend to the requisites for germination, which are moisture, heat, light, and air, and these should be carefully supplied.

The soil in which the seeds are sown should always be kept moist until germination takes place; afterwards they should be watered more sparingly.

The seeds should be kept shaded, and air admitted freely. After the seedlings have attained to a height of from three-fourth inch to one inch, they may be potted singly into two-inch pots, in a compost of fine black loam and sand, equal parts of each, and kept in a warm atmosphere, carefully watered, and shaded during sunshine.

As my experience in the cultivation of these valuable plants has only been one year, I will not attempt to say anything about open air cultivation; but I hope, if spared, to give a more detailed account of the propagation and cultivation of the *Chinchona* plant in its different stages of advancement in my next report.

(signed) *John McKay.*

New Quito, Kangra Valley,
1 March 1865.

COPY of a Letter from Secretary to Government, Punjab, to the Commissioner and Superintendent, Jullunder Division; (No. 436 A., dated 28 April 1864.)

WITH reference to your letter, No. 225, dated 31st October last, I am directed to forward, for your information, copies of the correspondence, marginally noted, relative to the application of Captain Nassau Lees, LL.D., for land for the purpose of planting experimentally the Chinchona plant.

From Punjab Government to Captain Lees, No. 1004, dated 7 Nov. 1863.
From Captain Lees dated 31 Dec. 1863

The Lieutenant Governor has already told Captain Lees that his Honour considers any charge imputing undue obstruction either to yourself or Mr. Egerton as destitute of foundation, and it will be seen from Dr. Lees' letter, now sent, that he no longer prefers this complaint

So far back as July last, the Lieutenant Governor informed Dr. Lees that his Honour was prepared, if he still desired it, to grant him 25 acres, at the average price per acre for the auction sales of the year, from the reserved land at Kusmul.

His Honour in so doing was actuated by the consideration that it is of great importance to give free scope to an experiment so valuable, if successful, as that which aims at the naturalization of the Chinchona plant. The objection founded by you on Captain Lees' absenteeism is now obviated by his having a professional English gardener on the spot, and his Honour is inclined to think that the experiment may perhaps be safer in Captain Lees' hands than if under the direct superintendence of Government.

The Lieutenant Governor has now, therefore, decided to grant 100 acres of the reserved land on the terms above stated, and I am to request you will be so good as to see that no delay takes place in marking off and delivering it to Captain Lees' agents.

No. 436 B., dated 28 April 1864.

COPY of the above forwarded for the information of Captain Lees.

By order, &c.,

R. H. Davies,
Secretary to Government, Punjab.

From Captain *W. N. Lees*, LL.D., to Secretary to Government, Punjab;
(dated 10 May 1864.)

I HAVE the honour to acknowledge receipt of copy of a letter from Secretary to Government, Punjab, to the Commissioner and Superintendent, Jullunder Division, No. 436 A., dated 28th April 1864.

The Lieutenant Governor has been pleased to permit me to purchase 100 acres of the land reserved by Government at the auction sale of the 9th June 1863, and I have to solicit that you will do me the favour to tender my acknowledgments to his Honour for this concession.

From Colonel *J. E. Gastrell*, Boundary Commissioner, to Captain *W. N. Lees*;
(dated Surveyor General's Office, 26 April 1865.)

REFERRING to a map of isothermal lines, I find that New Quito is situated at about the same distance north of the isothermal line of greatest heat, or, as some call it, the equator of heat, as Riobamba is to the south. The mean annual temperature of the places may therefore be assumed the same, apart of course, from all considerations of height.

The lofty ranges of mountains overhanging to the north-east of your Chinchona locality, are also very similar in relative position and effect to those dominating Riobamba to the north-west and west; both serve the same purpose for the plains and valleys extended at their feet, over which, in the first case, the south-west wind carries up clouds and vapour to be condensed, and which, falling in copious showers on the mountains, supplies the great affluents of the Indus with water, fertilising the Punjab. So also in South America, the south-east winds sweeping up from the Atlantic across the vast plains watered by the Amazon and its tributaries, carries up the clouds and vapour which subsequently supplies these great rivers with water.

The similarity between these places, notwithstanding differences of latitude, appears striking in these respects.

I hope you may be able to continue your observations at New Quito, and if you could add barometrical observations to them, they would be very valuable in helping to unravel the mysterious laws that govern our Indian atmosphere. When, hereafter, Government sanction a staff of meteorological observers in India, the whole might be reduced at the head quarter office, leaving mere recording to be done at your Chinchona plantation.

MONTHLY REPORT on the Number, Condition, and Distribution of Chinchona Plants at
New Quito on the 30th April 1865.

Num-ber.	Names.	Number on 31st March.	Number Propagated since.	Casualties.	Number on 30th April.	REMARKS.
1	<i>C. succirubra</i> -	2,793	290	5	3,078	All the plants and cuttings are in a most healthy condition. The number of plants imported in March 1864 was 213, of which eight were planted out, leaving 205 as a propagating stock.
2	<i>C. Calisaya</i> -	118	20	-	138	
3	<i>C. Condaminea</i> -	1,262	150	-	1,412	
4	<i>C. micrantha</i> -	75	5	2	78	
5	<i>C. Peruviana</i> -	49	-	-	49	
	TOTAL - -	4,297	465	7	4,755	

The number of plants in nursery beds is 500; they have commenced to grow, and will produce a number of cuttings this month.

The number of plants planted out permanently, is—

<i>C. succirubra</i>	-	-	-	-	-	-	-	80
<i>C. Condaminea</i>	-	-	-	-	-	-	-	11
<i>C. micrantha</i>	-	-	-	-	-	-	-	4
<i>C. Calisaya</i>	-	-	-	-	-	-	-	1=96

The average height of these plants, when planted out on the 15th of last month, was $7\frac{1}{2}$ inches; and they are now, without exception, healthy and vigorous young plants.

METEOROLOGICAL OBSERVATIONS taken at New Quito Chinchona Plantation, Kangra Valley, for September 1864.

Latitude, 32° 7' 8" N.; Longitude, 76° 28' 35" E. Height above the Sea, 4,500 feet.

Day of the Month.	OBSERVATIONS TAKEN AT 9.30 A.M.						OBSERVATIONS TAKEN AT 3.30 P.M.						REMARKS.						
	Maximum in Air.	Minimum in Air.	Mean in Air.	Maximum in Sun's Rays.	Wet Bulb Thermometer.	Dry Bulb Thermometer.	Computed. Dew Point	Elastic Force of Vapour.	Humidity.	Wind.	Cloud.	Wet Bulb Thermometer.		Dry Bulb Thermometer.	Computed. Dew Point	Elastic Force of Vapour.	Humidity.	Wind.	Cloud.
1	80.5	59.2	69.8	90.0	70.2	73.8	67.7	.678.	.813	S.	10	71.0	77.0	66.8	.657	.709	W.	2	Dense fog till 11 a.m., then cleared, and fair all day.
2	78.2	70.0	74.1	82.0	68.0	70.2	66.2	.644	.873	S.	8	68.2	71.0	66.0	.639	.843	W.	10	Ag. morn. cum. Showery in afternoon.
3	80.0	62.5	71.2	83.0	67.0	68.8	65.6	.630	.895	W.	10	70.0	73.0	67.6	.675	.832	S.	10	Ag. morn. overcast. Showery in afternoon.
4	76.5	60.8	63.6	78.5	67.0	69.5	65.0	.617	.856	S.E.	8	74.0	77.2	71.8	.779	.835	S.W.	2	Heavy rain from 2 to 4 a.m.; afternoon very warm.
5	86.3	64.2	75.2	97.8	69.0	73.0	65.8	.635	.783	S.W.	5	71.0	77.8	66.2	.644	.676	W.	8	Ag. morn.; afternoon cloudy; cum.
6	88.2	60.8	74.5	92.5	66.8	67.2	66.5	.650	.697	W.	10	72.5	79.8	67.4	.670	.660	W.	5	Showery in morn. Thundering in afternoon.
7	87.2	68.5	77.8	92.5	73.0	77.8	73.0	.811	.852	W.	5	70.2	75.8	66.3	.646	.725	W.	8	Ag. morn. heavy dew status. Showery in afternoon.
8	82.2	65.0	73.6	91.8	67.5	69.2	66.1	.641	.899	E.	2	70.5	72.5	68.9	.706	.885	S.W.	10	Del. morn. heavy dew status. Afternoon rainy.
9	80.2	65.0	72.6	89.0	68.0	69.8	66.6	.653	.897	W.	5	70.2	74.2	67.4	.671	.794	W.	2	Dist. thr. and a few drops rain in morn. Ag. afternoon.
10	83.2	58.0	70.6	92.0	70.2	75.5	66.5	.650	.737	W.	0	71.5	83.5	63.1	.578	.504	S.W.	2	Del. morn. heavy dew status. Del. afternoon.
11	84.2	58.0	71.1	96.5	68.2	80.0	59.9	.516	.504	S.E.	0	71.2	84.8	61.7	.550	.460	N.W.	2	Ag. morn. heavy dew. Sun's rays very hot.
12	88.0	59.8	63.4	98.0	71.0	80.0	64.7	.611	.597	N.	0	74.0	85.5	65.9	.637	.521	N.	2	Cum. del. morn. Sun very hot all day.
13	86.5	59.8	73.1	96.8	73.0	77.0	70.2	.738	.796	N.	0	73.5	85.0	65.4	.626	.520	S.	2	Morn. sun very hot. Del. afternoon.
14	87.0	64.5	75.5	99.8	68.2	69.8	66.9	.659	.905	N.	2	70.0	70.0	70.0	.733	1.000	N.	10	Ag. morn. stratus. Thunder and rain in afternoon.
15	83.5	60.5	72.0	99.2	70.0	74.0	67.2	.666	.794	N.	2	74.0	77.8	71.3	.766	.805	N.	2	Snow on high ranges. Afternoon sun very hot.
16	82.5	62.0	72.2	89.8	64.3	67.5	61.7	.550	.817	N.W.	2	70.5	76.8	66.1	.641	.696	W.	10	Del. morn. stratus. Thunder in afternoon.
17	80.5	60.2	70.3	90.2	67.5	75.8	61.7	.550	.617	S.W.	5	69.0	75.0	64.8	.613	.706	S.W.	8	Del. morn. heavy dew. Most ag. afternoon.
18	81.5	65.0	73.2	90.0	70.5	76.8	66.1	.641	.696	N.E.	2	71.0	83.8	62.0	.556	.480	N.E.	2	Ag. morn. cum. Again afternoon cum.
19	82.0	60.0	71.0	91.2	68.0	76.0	62.4	.564	.629	W.	5	76.0	80.8	72.6	.800	.762	W.	2	Del. morning, heavy dew. Sun very powerful.
20	82.2	64.5	73.3	94.5	65.5	69.5	62.3	.562	.780	N.	2	75.0	82.5	69.7	.726	.654	N.	2	Ag. morn. stratus. Sun very hot all day.
21	83.1	59.2	71.1	95.8	62.5	69.2	57.1	.467	.655	N.	0	67.0	82.0	56.5	.457	.418	N.W.	2	Morn. sun very hot. Cum. Del. afternoon.
22	82.0	59.2	70.6	96.2	60.0	64.8	56.2	.452	.737	N.	0	70.2	81.4	62.4	.564	.527	N.	0	Morning very cold. Sun very hot all day.
23	81.8	53.8	67.8	97.2	61.8	67.3	57.4	.472	.707	N.	0	71.2	77.8	66.6	.653	.685	N.	0	Most ag. morn. Afternoon sun very hot.
24	84.2	54.8	69.5	97.8	61.3	66.2	57.4	.472	.733	N.	0	65.8	72.0	60.8	.553	.680	S.	0	Del. morn. Sun's rays very powerful all day.
25	89.0	57.5	73.2	100.0	60.8	69.8	53.6	.412	.566	S.	0	64.5	80.5	53.3	.407	.391	S.	0	Ag. morn. Sun's rays very powerful.
26	87.2	52.5	69.8	102.4	59.2	70.3	50.3	.364	.491	N.	0	65.5	82.0	53.9	.416	.381	N.	0	Morning very cold. Del. afternoon.
27	89.2	54.5	71.8	100.8	57.2	80.2	41.1	.258	.321	N.	0	67.2	79.5	58.6	.493	.490	N.	0	Morning sun very hot. Ag. afternoon.
28	90.2	53.8	72.0	105.3	60.8	80.0	47.4	.328	.321	N.	0	64.8	80.5	53.8	.415	.399	N.	0	Very cold morn. Sun's rays very hot all day.
29	94.2	57.8	76.0	100.8	67.8	79.8	59.4	.507	.499	N.	0	66.8	82.2	56.0	.449	.409	N.	0	Ag. morn. Del. afternoon.
30	90.8	52.8	71.8	99.8	60.2	76.8	48.6	.343	.372	N.	0	69.0	84.8	57.9	.481	.403	N.	0	Cold morn. Very warm afternoon.
Sums	2534.1	1804.2	2151.7	2761.4	1986.5	2185.6	-	-	-	-	83	2105.3	2366.5	-	-	-	-	100	
Means	84.4	60.1	71.7	92.1	66.2	72.9	60.8	.583	.659	-	2	70.2	78.9	64.1	.598	.606	-	3	

METEOROLOGICAL OBSERVATIONS taken at New Quito Clinchona Plantation, Kangra Valley, for the Month of October 1864.
Latitude, 32° 7' 8" N.; Longitude, 76° 28' 35" E. Height above the Sea, 4,500 feet.

Day of the Month.	OBSERVATIONS TAKEN AT 9.30 A.M.				OBSERVATIONS TAKEN AT 3.30 P.M.							REMARKS.								
	Maximum in Air.	Minimum in Air.	Mean in Air.	Maximum in Sun's Rays.	Wet Bulb Thermometer.	Dry Bulb Thermometer.	Dew Point Computed.	Elastic Force of Vapour.	Humidity.	Cloud.	Wind.		Rain.	Wet Bulb Thermometer.	Dry Bulb Thermometer.	Dew Point Computed.	Elastic Force of Vapour.	Humidity.	Cloud.	Wind.
1	84.5	54.8	69.6	98.2	58.2	70.0	48.8	.345	.471	0	N.	0'	70.2	75.8	66.3	.646	.725	0	N.	Del. morn. Beautiful afternoon.
2	80.8	52.2	66.5	90.2	57.8	69.2	48.7	.344	.482	0	N.	0'	68.0	80.5	59.2	.504	.485	0	N.	Ag. morn. heavy dew. Del. afternoon.
3	87.2	53.0	70.5	99.8	60.0	69.8	52.2	.391	.537	0	N.	0'	62.2	81.0	49.0	.348	.329	2	N.E.	Del. morn. heavy dew. Ag. afternoon cum.
4	85.5	50.2	67.8	99.2	60.8	71.5	52.2	.391	.507	0	S.	0'	68.5	70.8	66.7	.655	.870	2	N.	Del. morn. heavy dew. Afternoon squally.
5	88.5	51.2	69.8	90.4	57.8	68.4	49.3	.352	.507	0	-	0'	68.5	75.8	63.4	.584	.655	2	N.	Ag. morn. Del. afternoon cum.
6	85.5	57.8	71.6	90.8	60.5	66.8	55.5	.441	.670	0	N.	0'	67.8	75.5	62.4	.564	.639	2	N.	Ag. morn. Del. afternoon cum.
7	84.8	50.8	67.8	90.5	67.2	69.0	65.8	.635	.896	0	N.	0'	69.8	74.2	66.7	.655	.775	2	N.	Del. morn. heavy dew. Ag. afternoon cum.
8	84.5	48.8	66.6	97.8	59.8	64.2	55.8	.446	.743	0	N.	0'	64.8	69.8	60.8	.533	.732	2	N.	Very cold morn. Beautiful afternoon cum.
9	89.5	50.2	69.8	99.8	48.8	59.8	38.9	.237	.461	0	N.	0'	67.2	70.8	64.3	.603	.801	5	N.	Del. morn. Beautiful afternoon cum.
10	79.8	45.8	62.8	90.2	49.8	58.8	41.7	.264	.532	0	N.	0'	65.8	74.8	59.5	.509	.590	2	N.	Del. morn. Del. afternoon stratus.
11	84.8	50.5	67.6	97.8	57.8	64.5	52.4	.388	.639	0	N.	0'	64.8	74.8	57.8	.479	.556	5	N.	Ag. morn. Beautiful afternoon stratus.
12	87.8	50.2	68.0	99.8	54.2	60.0	49.0	.348	.672	0	N.	0'	64.8	72.0	59.0	.500	.638	2	N.	Ag. morn. Del. afternoon cum.
13	87.8	49.8	68.8	100.0	52.5	58.8	46.8	.320	.645	0	N.	0'	69.8	74.2	66.7	.655	.775	2	N.	Cold morn. heavy dew. Ag. afternoon cum.
14	79.8	47.4	63.6	90.8	50.6	57.2	44.7	.296	.631	0	N.	0'	64.8	77.2	56.1	.451	.483	5	N.	Del. morn. Beautiful afternoon cum.
15	87.8	43.8	65.8	89.8	49.5	52.8	46.2	.313	.782	0	N.	0'	68.2	72.4	64.8	.613	.771	8	N.	Very cold morn. Thunder in afternoon.
16	80.8	47.8	64.3	88.8	49.8	57.2	43.1	.279	.595	0	N.	0'	60.2	70.0	52.4	.394	.544	5	N.	Cold morn. heavy dew. Thunder; a few drops rain.
17	82.2	43.0	62.6	90.0	47.2	50.0	44.1	.289	.801	0	N.	0'	60.2	65.8	55.4	.439	.691	5	N.	Very cold morn. Beautiful afternoon.
18	82.8	47.4	65.1	86.8	49.8	54.5	45.1	.301	.708	0	N.	0'	60.2	65.0	56.4	.456	.739	8	N.	Beautiful morn. Thunder and one shower of rain.
19	80.5	50.0	65.2	84.8	54.5	64.5	46.5	.317	.522	2	N.	0'	64.0	75.8	55.7	.444	.498	2	S.	Del. morn. cum.; one shower rain at 12 p.m.
20	80.8	50.0	65.4	84.8	47.0	52.2	41.8	.265	.678	0	N.	0.275	61.2	77.8	49.6	.356	.374	0	S.	Del. morn. Squally in afternoon.
21	88.8	48.8	68.8	99.0	52.5	56.5	48.9	.346	.757	0	N.	0'	60.5	70.2	52.7	.398	.539	0	N.	Del. morn. Del. afternoon.
22	80.2	48.8	64.5	88.8	50.2	59.2	42.1	.268	.532	0	N.	0'	61.2	70.2	54.0	.418	.566	2	N.	Ag. morn. Beautiful afternoon.
23	84.5	47.2	65.8	90.8	49.8	60.5	40.2	.249	.472	0	N.	0'	64.8	72.8	58.4	.489	.607	0	N.	Del. morn. Del. afternoon.
24	80.7	45.8	63.2	97.2	49.5	60.0	40.0	.248	.479	0	N.	0'	60.0	64.0	56.4	.456	.765	0	N.	Ag. morn. Beautiful afternoon.
25	84.8	50.2	67.5	90.2	54.0	64.2	44.8	.297	.495	0	S.	0'	50.2	60.0	41.4	.361	.504	0	N.	Ag. morn. heavy dew. Del. afternoon.
26	82.8	48.8	65.8	90.0	50.0	58.8	42.1	.268	.540	0	S.	0'	62.2	65.8	59.3	.505	.795	0	N.	Del. morn. Beautiful afternoon.
27	84.2	48.5	66.3	89.2	52.2	60.0	45.2	.302	.586	0	N.	0'	65.5	60.2	51.3	.378	.724	0	N.	Del. morn. Del. afternoon.
28	80.8	45.2	63.0	90.2	49.2	55.5	42.9	.277	.628	0	N.	0'	55.5	59.8	51.6	.383	.745	0	N.	Ag. morn. heavy dew. Ag. afternoon.
29	85.8	49.8	67.8	89.8	52.2	60.2	45.0	.299	.573	0	N.E.	0'	60.5	67.8	54.7	.428	.629	0	N.	Del. morn. Beautiful afternoon.
30	89.5	47.8	68.6	99.8	49.8	55.5	44.1	.289	.655	0	N.	0'	60.2	66.8	54.9	.432	.658	0	N.	Ag. morn. Del. afternoon.
31	80.5	50.2	65.3	88.5	55.2	60.5	50.4	.366	.694	2	N.	0'	60.2	68.5	53.6	.412	.591	5	N.	Ag. morn. cum. Beautiful afternoon cum.
Sums	2608.3	1525.8	2065.8	2773.8	1658.2	1890.1	-	-	-	4	-	0.275	1961.6	2200.1	-	-	-	71	-	-
Means	84.1	49.2	66.6	89.4	53.5	61.0	46.7	.319	.594	-	-	.002	63.8	71.8	57.3	.427	.623	6	-	-

METEOROLOGICAL OBSERVATIONS taken at New Quito Chinchona Plantation, Kangra Valley, 101 November 1901.

Height above the Sea, 4,500 feet.

Latitude, 32° 7' 8" N.; Longitude, 76° 28' 35" E.

Day of the Month.	OBSERVATIONS TAKEN AT 9.30 A.M.							OBSERVATIONS TAKEN AT 3.30 P.M.							REMARKS.					
	Maximum in Air.	Minimum in Air.	Mean in Air.	Maximum in Sun's Rays.	Wet Bulb Thermometer.	Dry Bulb Thermometer.	Dew Point Computed.	Elastic Force of Vapour.	Humidity.	Cloud.	Wind.	Rain.	Wet Bulb Thermometer.	Dry Bulb Thermometer.		Dew Point Computed.	Elastic Force of Vapour.	Humidity.	Wind.	Cloud.
1	79.2	47.8	63.5	89.5	49.8	54.2	45.4	.304	.722	0	N.	0	60.8	75.2	50.7	.370	.424	N.	0	Ag. morn. heavy dew. Del. afternoon.
2	78.8	49.5	64.1	88.5	50.2	54.5	45.9	.310	.729	0	N.	0	55.8	70.8	43.8	.286	.380	N.	0	Fresh morn. heavy dew. Ag. afternoon.
3	88.5	48.0	68.7	94.5	50.0	54.2	45.8	.309	.734	0	N.	0	60.5	77.8	48.4	.340	.357	N.	0	Ag. morn. heavy dew. Del. afternoon.
4	80.0	45.5	62.7	89.2	47.2	50.4	43.7	.285	.779	0	N.	0	62.5	77.8	51.8	.566	.405	N.	2	Cold morn. heavy dew. Ag. afternoon stratus.
5	79.5	47.8	63.5	88.5	49.8	54.5	45.1	.301	.708	0	S.	0	59.8	67.8	53.4	.409	.602	N.	0	Beautiful morn. Afternoon very cold.
6	88.4	44.5	66.4	89.8	47.2	50.2	43.9	.287	.788	0	N.	0	60.2	68.8	53.3	.407	.578	N. E.	2	Cold morn. heavy dew. Ag. afternoon cum.
7	80.2	45.2	62.7	87.0	48.2	54.5	41.9	.266	.626	0	N.	0	60.8	72.5	51.4	.380	.476	N.	2	Ag. morn. Del. afternoon cum.
8	80.2	47.0	63.6	85.2	50.0	54.2	45.8	.309	.734	0	N.	0	62.5	66.2	59.5	.509	.790	N.	2	Del. morn. Beautiful afternoon cum.
9	80.0	46.2	63.0	84.0	48.8	52.2	45.4	.304	.777	0	N.	0	55.5	65.8	47.3	.326	.513	N.	5	Ag. morn. heavy dew. Del. afternoon cum.
10	77.5	47.2	62.3	88.0	49.5	54.0	45.0	.299	.715	0	N.	0	60.0	70.2	51.8	.386	.523	N.	2	Del. morn. Afternoon squally.
11	78.2	48.0	63.1	81.5	50.0	54.2	45.8	.309	.734	0	N.	0	58.2	66.8	51.3	.378	.575	N.	5	Ag. morn. heavy dew. Beautiful afternoon cum.
12	79.2	48.2	63.7	84.0	50.2	57.5	43.6	.284	.599	0	N.	0	58.8	66.8	52.4	.394	.600	N.	2	Ag. morn. afternoon squally.
13	77.8	45.2	61.5	82.5	47.5	50.2	44.5	.294	.808	0	S.	0	64.5	77.2	55.6	.443	.475	N.	2	Cold morn. Del. afternoon stratus.
14	79.5	45.0	62.2	82.2	48.2	52.2	44.2	.291	.744	0	N.	0	82.2	75.5	52.9	.401	.455	N.	8	Cold morn. heavy dew. Mild afternoon cum.
15	79.2	45.5	62.3	84.0	48.5	52.0	45.0	.299	.771	0	N.	0	58.2	67.8	50.5	.368	.541	N.	5	Ag. morn. Afternoon very threatening.
16	77.2	46.0	61.6	82.0	48.2	52.0	44.4	.293	.755	0	N.	0	60.2	64.0	56.8	.462	.775	N.	10	Cold morn. Thunder all night, one shower rain.
17	75.8	44.2	60.0	79.8	46.2	48.0	44.2	.291	.868	5	N.	0	57.0	64.2	50.5	.368	.613	N.	5	Thunder, a few drops rain. Del. afternoon cum.
18	70.2	41.0	56.6	77.2	46.2	50.0	42.0	.267	.740	0	N.	0	67.0	71.2	63.6	.588	.770	N	2	Very cold morn. Ag. afternoon stratus.
19	74.2	39.5	56.8	78.5	41.8	50.0	32.8	.187	.518	0	N.	0	60.2	75.0	49.8	.358	.413	N.	2	Very cold morn. Del. afternoon cum.
20	78.5	40.8	59.6	87.2	44.2	48.8	39.1	.239	.693	0	N.	0	58.2	66.8	51.3	.378	.575	N.	2	Ag. morn. Del. afternoon cum.
21	77.8	40.0	58.9	88.5	43.5	50.2	36.1	.213	.585	0	N.	0	51.2	61.0	42.4	.271	.505	N.	0	Cold morn. heavy dew. Del. afternoon.
22	78.0	39.5	58.7	88.2	42.0	60.0	25.8	.185	.261	0	N.	0	50.5	65.0	38.9	.237	.384	N.	0	Sharp morn. Cold afternoon.
23	80.0	38.2	58.2	87.0	40.0	46.2	33.2	.200	.639	0	N.	0	51.5	65.5	40.3	.250	.398	N.	0	Very cold morn. Del. afternoon.
24	77.5	38.2	57.8	85.2	46.0	54.0	38.0	.229	.548	0	N.	0	51.5	65.2	40.5	.252	.405	N.	0	Very sharp morn. Beautiful afternoon.
25	74.5	39.5	57.0	80.0	49.0	61.0	38.2	.231	.430	0	N.	0	50.2	66.2	37.4	.224	.348	N.	0	Cold morn. heavy dew. Del. afternoon.
26	70.2	39.8	55.0	84.2	44.5	47.5	41.2	.259	.787	0	N.	0	60.0	64.2	56.2	.452	.753	N.	5	Ag. morn. Beautiful afternoon cum.
27	75.2	40.2	57.7	79.5	47.8	54.8	40.8	.255	.593	0	S.	0	60.2	66.8	54.9	.432	.658	N.	8	Ag. morn. Del. afternoon cum.
28	70.0	40.2	55.1	78.5	44.2	60.0	30.0	.165	.319	0	S.	0	60.8	65.5	57.0	.466	.742	N.	8	Ag. morn. Del. afternoon cum.
29	77.2	39.5	58.3	84.2	42.8	55.0	30.6	.169	.390	0	S.	0	55.5	67.8	45.7	.307	.451	W.	10	Cold morn. heavy dew. Ag. afternoon cum.
30	70.8	40.5	55.6	77.0	47.8	54.2	41.4	.261	.620	0	N.	0	60.5	70.8	52.3	.393	.522	W.	0	Ag. morn. Beautiful afternoon.
Sums	2333.3	1307.7	1820.2	2535.4	1409.3	1590.7	-	-	-	5	-	0	1754.8	2066.2	-	-	-	-	-	89
Means	77.7	43.5	60.6	84.5	47.0	53.0	41.0	.257	.638	-	-	0	58.5	68.9	50.2	.364	.516	-	-	3

METEOROLOGICAL OBSERVATIONS taken at New Quito Chinchona Plantation, Kangra Valley, for December 1864.
Latitude, 32° 7' 8" N.; Longitude, 76° 28' 35" E. Height above the Sea, 4,500 feet.

Day of the Month.	Maximum in Air.	Minimum in Air.	Mean in Air.	Maximum in Sun's Rays.	OBSERVATIONS TAKEN AT 9.30 A.M.						OBSERVATIONS TAKEN AT 3.30 P.M.						REMARKS.					
					Wet Bulb Thermometer.	Dry Bulb Thermometer.	Dew Point Thermometer.	Dew Point Computed.	Elastic Force of Vapour.	Humidity.	Rain.	Cloud.	Wind.	Wet Bulb Thermometer.	Dry Bulb Thermometer.	Dew Point Thermometer.		Dew Point Computed.	Elastic Force of Vapour.	Humidity.	Cloud.	Wind.
1	74.2	38.2	56.2	79.5	40.2	45.8	34.0	.196	.634	0	0	N.	58.2	65.8	52.1	.390	.614	2	N.	Ag. morn. Beautiful afternoon.		
2	74.2	36.0	55.1	80.5	39.5	44.2	3.9	.195	.670	0	0	N.	50.0	54.2	45.8	.309	.734	0	N.	Ag. morn. dew. Cold afternoon.		
3	78.0	32.0	55.0	80.8	36.5	40.0	31.9	.180	.726	0	0	N.	54.8	64.2	46.3	.314	.523	2	N.	Sharp morn. Beautiful afternoon.		
4	Broken.	-	-	-	37.5	44.2	29.5	.161	.553	0	0	S.	50.0	64.8	38.2	.231	.377	5	N.	Ag. morn. dew. Del. afternoon.		
5	-	-	-	-	40.2	44.0	35.6	.209	.726	0	5	W.	50.2	54.2	46.2	.313	.743	5	W.	Pleasant morn. Afternoon threatening.		
6	-	-	-	-	40.2	45.5	34.4	.199	.652	0	10	W.	50.0	54.0	46.0	.311	.744	10	W.	Ag. morn. cum. Very strong wind afternoon.		
7	-	-	-	-	40.0	41.0	38.7	.235	.914	.075	10	N.	45.0	45.0	45.0	.289	1.000	10	N.	Very disagreeable morn. Driz. rain all day.		
8	-	-	-	-	45.8	47.5	43.9	.287	.872	.4	10	N.	54.2	54.8	53.6	.412	.958	10	N.	Rain in morn. Raining all day.		
9	-	-	-	-	45.8	54.2	37.4	.224	.532	.3	10	N.	54.2	58.2	50.6	.369	.759	10	N.	Mild morn. Strong wind in afternoon.		
10	-	-	-	-	45.8	49.5	41.7	.264	.746	0	10	N.	50.5	63.2	39.1	.289	.412	10	N.	Del. morn. Strong cold wind in afternoon.		
11	-	-	-	-	47.2	49.8	44.3	.292	.816	0	10	N.	50.5	55.2	45.8	.309	.709	10	N.	Strong cold wind all day.		
12	-	-	-	-	47.2	47.2	47.2	.325	1.000	.025	10	N.	56.8	60.2	53.7	.413	.791	10	N.	Ag. morn. Del. afternoon mild.		
13	-	-	-	-	48.2	49.8	46.4	.316	.883	.150	10	N.	50.2	54.0	46.4	.316	.756	10	N.	Mild morn. Ag. afternoon.		
14	-	-	-	-	47.8	49.2	46.3	.314	.897	.2	10	N.	50.0	52.2	47.8	.333	.852	10	N.	Thunder, rain, and hail all day.		
15	-	-	-	-	40.2	44.8	34.7	.202	.680	.225	10	N.	48.8	50.5	47.1	.324	.880	10	N.	Driz. rain in morn. Ag. afternoon.		
16	-	-	-	-	38.8	40.2	37.0	.220	.884	0	10	N.	48.2	48.8	47.5	.329	.954	10	N.	Cold morn. Raining in afternoon.		
17	-	-	-	-	48.5	51.0	46.0	.311	.832	.325	10	E.	50.2	51.2	49.2	.350	.928	10	N. E.	Cold morn. Heavy rain in afternoon.		
18	-	-	-	-	47.8	49.2	46.3	.314	.897	1.108	10	S. W.	51.2	54.8	47.6	.330	.767	10	W.	Heavy rain in morn. Thunder all day.		
19	-	-	-	-	40.2	47.8	31.8	.179	.538	.4	0	N.	48.5	54.2	42.8	.276	.656	0	S.	Ag. morn. Beautiful afternoon.		
20	-	-	-	-	40.0	49.8	29.2	.159	.444	0	0	N.	51.5	61.0	42.9	.277	.516	0	N.	Very cold morn. Del. afternoon.		
21	-	-	-	-	47.8	54.0	41.6	.263	.629	0	0	N.	54.8	60.1	50.0	.361	.694	0	N.	Del. morn. dew. Beautiful afternoon.		
22	-	-	-	-	42.5	50.0	34.2	.198	.548	0	0	N.	54.2	62.8	46.5	.317	.554	0	N.	Ag. morn. frost. Beautiful afternoon.		
23	-	-	-	-	38.2	50.0	25.2	.131	.363	0	0	N.	58.0	62.5	53.9	.416	.735	0	-	Ag. morn. frost. Del. afternoon.		
24	-	-	-	-	40.2	47.8	31.8	.179	.538	0	0	N.	50.2	54.8	45.6	.366	.712	0	N.	Ag. morn. dew. Beautiful afternoon.		
25	-	-	-	-	38.2	45.5	30.2	.166	.544	0	0	N.	54.2	61.0	48.1	.336	.626	0	N.	Ag. morn. frost. Del. afternoon.		
26	-	-	-	-	38.2	45.0	30.0	.165	.552	0	0	N.	40.2	48.8	30.7	.170	.493	0	N.	Very sharp morn. frost. Del. afternoon.		
27	-	-	-	-	40.2	48.8	30.7	.170	.493	0	0	N.	55.0	64.2	46.7	.319	.531	0	N.	Del. morn. dew. Beautiful afternoon.		
28	-	-	-	-	38.2	40.8	34.8	.202	.792	0	0	N.	54.2	60.1	48.9	.346	.665	2	N.	Cold morn. frost. Del. afternoon.		
29	-	-	-	-	38.8	47.2	29.6	.162	.498	0	2	N.	50.2	58.8	42.5	.272	.548	0	N.	Ag. morn. Beautiful afternoon.		
30	-	-	-	-	40.2	47.8	31.8	.179	.538	0	2	N.	50.2	64.0	37.8	.227	.381	0	N.	Del. morn. Ag. afternoon.		
31	-	-	-	-	40.2	48.8	30.7	.170	.493	0	0	N.	54.2	64.0	45.4	.304	.510	0	N.	Ag. morn. Beautiful afternoon.		
Sums -	226.4	106.2	166.3	240.8	1300.1	1460.4	-	-	-	3.208	139	-	1598.4	1781.6	-	-	-	146	-	-		
Means -	7.3	3.4	5.4	8.0	41.9	47.1	36.2	.214	.660	.103	4	-	51.6	57.5	46.3	.314	.662	4	-	-		

OF THE CHINCHONA PLANT INTO INDIA.

OBSERVATIONS TAKEN AT 9.30 A.M.															OBSERVATIONS TAKEN AT 3.30 P.M.															REMARKS.
Day of the Month.	Wet Bulb Thermometer.	Dry Bulb Thermometer.	Dew Point Computed.	Elastic Force of Vapour. Inches.	Humidity.	Cloud.	Wind.	Rain.	Wet Bulb Thermometer.	Dry Bulb Thermometer.	Dew Point Computed.	Elastic Force of Vapour. Inches.	Humidity.	Cloud.	Wind.															
1	40.0	47.8	31.4	.176	.529	0	N.	0	50.2	57.8	43.4	.282	.589	5	N.	Ag. morn. Afternoon cold and squally. Cold morn. frost. Del. afternoon.														
2	38.0	44.5	30.2	.166	.565	0	N.	0	50.8	61.0	41.6	.263	.490	0	N.	Ag. morn. Del. afternoon, very warm Beautiful morn. Afternoon pleasant.														
3	37.5	48.5	25.4	.132	.387	0	N.	0	54.2	61.2	47.9	.334	.617	0	N.	Ag. morn. heavy dew. Beautiful afternoon. Pleasant morn. Beautiful afternoon.														
4	38.5	45.8	30.5	.169	.547	0	N.	0	54.8	61.2	49.0	.348	.643	2	N.W.	Ag. morn. Del. afternoon, heavy rain. Pleasant morn. Cold afternoon, heavy rain.														
5	41.8	50.0	32.8	.187	.518	0	N.	0	50.2	58.0	43.2	.280	.581	5	S.	Ag. morn. Del. afternoon. Del. morn. heavy dew. Beautiful afternoon.														
6	39.8	44.8	33.8	.194	.653	0	N.	0	49.8	51.8	47.8	.333	.863	8	S.	Very sharp morn. Beautiful afternoon. Beautiful morn. Del. afternoon.														
7	50.0	54.2	45.8	.309	.734	10	S.	0	50.0	52.2	47.8	.333	.852	10	N.	Ag. morn. Del. afternoon. Del. morn. heavy dew. Beautiful afternoon.														
8	38.8	45.8	31.1	.174	.563	0	N.	4	48.8	52.5	45.1	.301	.762	8	N.	Very sharp morn. Beautiful afternoon. Beautiful morn. Del. afternoon.														
9	38.5	44.2	31.7	.179	.615	0	N.	0	50.0	61.5	39.6	.244	.447	2	N.	Mild morn. Pleasant afternoon. Ag. morn. Del. afternoon.														
10	37.8	48.5	26.0	.136	.399	0	N.	0	49.8	58.5	42.0	.267	.644	0	N.	Del. morn. heavy dew. Beautiful afternoon. Very sharp morn. Beautiful afternoon.														
11	39.8	44.8	33.8	.194	.653	2	N.	0	48.8	59.5	39.2	.240	.472	5	S.	Beautiful morn. Del. afternoon. Mild morn. Pleasant afternoon.														
12	40.8	59.2	24.2	.125	.248	2	S.	0	58.0	61.2	55.1	.435	.804	8	S.	Ag. morn. Del. afternoon. Mild morn. Beautiful afternoon.														
13	39.8	45.0	33.6	.193	.645	0	N.	0	50.8	64.2	38.7	.235	.392	8	N.E.	Beautiful mild morn. Del. afternoon. Mild morn. Pleasant afternoon.														
14	39.8	49.8	28.8	.156	.436	10	S.	0	52.0	59.2	45.5	.305	.605	8	S.	Del. morn. Beautiful afternoon. Del. morn. Beautiful afternoon.														
15	50.0	61.2	39.9	.247	.457	2	S.	0	60.2	64.8	56.5	.457	.746	8	S.	Ag. morn. Del. afternoon. Ag. morn. Del. afternoon.														
16	53.0	59.2	47.4	.328	.651	5	S.	0	60.0	64.8	56.2	.452	.737	5	S.	Ag. morn. Del. afternoon. Ag. morn. Del. afternoon.														
17	52.2	60.0	45.2	.302	.583	5	N.	0	44.2	59.0	30.9	.172	.344	5	S.	Ag. morn. Del. afternoon. Ag. morn. Del. afternoon.														
18	54.0	60.2	48.4	.340	.651	2	S.	0	60.0	65.8	55.4	.439	.691	5	N.W.	Ag. morn. Del. afternoon. Ag. morn. Del. afternoon.														
19	49.8	56.2	42.2	.269	.554	10	W.	0	58.5	64.8	53.5	.410	.669	8	S.	Ag. morn. Del. afternoon. Ag. morn. Del. afternoon.														
20	44.2	50.2	37.6	.226	.621	2	S.	0	59.8	64.2	55.8	.446	.743	8	S.	Very mild morn. Del. afternoon, rainy. Ag. morn. Del. afternoon.														
21	48.5	54.0	43.0	.278	.665	5	S.	0	64.2	64.5	64.0	.596	.982	10	S.	Ag. morn. Del. afternoon. Ag. morn. Del. afternoon.														
22	47.8	50.2	45.2	.302	.830	5	W.	.075	62.5	64.8	60.7	.531	.866	5	S.	Pleasant morn. Beautiful afternoon. Del. morn. Pleasant afternoon.														
23	47.8	60.0	36.8	.219	.423	0	N.	0	55.5	64.5	48.3	.339	.558	2	W.	Del. morn. Pleasant afternoon. Del. morn. Pleasant afternoon.														
24	55.2	62.5	48.6	.343	.606	2	S.	0	57.2	64.5	51.4	.380	.626	5	S.W.	Ag. morn. Del. afternoon. Ag. morn. Del. afternoon.														
25	50.2	60.2	41.2	.259	.496	8	S.	0	56.5	65.0	49.7	.357	.579	5	W.	Del. morn. Sun very hot in afternoon. Ag. morn. Del. afternoon.														
26	51.0	57.5	45.2	.301	.635	0	S.	0	55.0	65.0	47.0	.323	.524	0	W.	Del. morn. Pleasant afternoon. Del. morn. Pleasant afternoon.														
27	51.0	57.0	45.6	.306	.657	0	N.	0	55.5	63.5	48.3	.339	.578	2	S.	Ag. morn. Del. afternoon. Ag. morn. Del. afternoon.														
28	56.0	64.2	48.6	.343	.772	0	S.	0	60.2	65.8	55.7	.444	.699	2	S.	Threatening morn. Afternoon squally. Disagreeable morn. ; heavy rain all day.														
29	49.0	52.5	45.5	.305	.720	10	S.	0	60.0	65.8	55.4	.489	.691	8	S.W.	Disagreeable morn. ; heavy rain all day. Disagreeable morn. ; heavy rain and hail all day.														
30	44.0	44.2	43.8	.286	.983	10	S.W.	.1	46.2	46.8	45.5	.305	.953	10	S.W.															
31	41.0	41.0	41.0	.257	1.000	10	S.W.	2.625	44.2	44.2	44.2	.291	1.000	10	S.W.															
Sums -	1405.6	1525.2	-	-	-	100	-	3.200	1677.9	1877.6	-	-	-	167	-															
Means -	45.3	49.2	41.0	.257	.734	-	-	-	54.1	60.6	48.2	.388	.689	-	-															

(signed) J. Mc Kay.

New Quito, 31 January 1865.

METEOROLOGICAL OBSERVATIONS taken at New Quito Chinchona Plantation, Kangra Valley, for February 1865.
Latitude, 32° 7' 8" N.; Longitude, 76° 28' 35" E. Height above the Sea, 4,500 feet.

Day of the Month.	OBSERVATIONS TAKEN AT 9.30 A.M.							OBSERVATIONS TAKEN AT 3.30 P.M.							REMARKS.	
	Wet Bulb Thermometer.	Dry Bulb Thermometer.	Dew Point Computed.	Elastic Force of Vapour.	Humidity.	Cloud.	Wind.	Rain.	Wet Bulb Thermometer.	Dry Bulb Thermometer.	Dew Point Computed.	Elastic Force of Vapour.	Humidity.	Cloud.		Wind.
1	41.2	51.2	31.2	.174	.462	5	S.	1.150	39.8	40.5	38.9	.237	.940	8	S.E.	Beautiful morn. Terrific thunderstorm in afternoon.
2	40.0	44.2	35.0	.204	.701	2	S.	1.0	44.5	54.8	34.2	.198	.460	8	S.	Del. morn. Light rain and threatening afternoon.
3	38.2	44.2	31.0	.173	.594	0	N.	0	50.0	58.2	42.6	.273	.562	0	S.W.	Sharp morn.; heavy dew. Del. afternoon.
4	45.8	52.8	38.8	.236	.590	5	N.	0	55.5	65.2	47.7	.331	.532	2	S.	Ag. morn. Beautiful afternoon.
5	40.2	55.2	25.2	.131	.300	2	N.	0	60.2	65.8	55.7	.444	.699	5	S.W.	Del. morn. Beautiful mild afternoon.
6	47.8	56.2	39.4	.242	.535	0	N.	0	57.8	66.2	51.1	.376	.584	5	S.	Ag. morn. Del. afternoon, very mild.
7	46.0	53.2	38.8	.236	.581	10	S.	0	52.8	64.0	42.7	.274	.460	10	S.	Mild morn. Beautiful afternoon.
8	50.0	54.2	45.8	.309	.734	5	S.	0.6	46.2	47.8	44.4	.293	.880	10	S.	Ag. morn.; heavy rain at 4 a.m. Disagreeable afternoon.
9	41.0	41.2	40.7	.254	.981	10	S.	1.875	45.0	45.2	44.8	.297	.983	10	N.	Heavy rain all morn. Sharp afternoon.
10	40.0	43.5	35.8	.210	.742	0	S.	0.6	48.5	51.8	45.2	.302	.782	10	N.	Ag. morn. Beautiful afternoon; heavy rain at 10 p. m.
11	40.0	44.8	34.2	.198	.667	0	W.	0.350	49.2	54.0	44.4	.293	.700	10	E.	Del. morn. Ag. afternoon. Thunder.
12	48.8	55.0	42.6	.273	.630	0	N.	0	54.2	61.0	48.1	.336	.626	5	S.	Ag. morn. Beautiful afternoon.
13	38.2	38.5	37.8	.227	.970	10	S.	0.380	50.2	58.8	42.5	.272	.548	8	S.	Disagreeable morn.; heavy rain. Ag. afternoon.
14	40.0	50.5	29.5	.161	.438	0	S.	0.2	54.2	58.8	50.1	.362	.730	2	S.	Del. morn. Beautiful afternoon.
15	40.2	56.2	24.2	.125	.277	0	S.	0	54.8	62.8	47.6	.330	.577	2	S.	Ag. morn. Pleasant afternoon.
16	39.8	48.8	29.9	.164	.475	8	S.W.	0	47.8	52.2	43.4	.282	.721	10	S.	Threatening in morn. Strong wind in aft. Drizz. rain.
17	47.0	51.5	42.5	.272	.714	10	S.	0.1	50.0	58.2	42.6	.273	.562	8	S.	Ag. morn. Del. afternoon, very mild.
18	48.2	50.0	46.2	.313	.867	5	S.	0	50.2	60.0	41.4	.261	.504	2	S.	Del. morn. Mild afternoon.
19	40.8	48.8	32.0	.181	.525	0	S.	0	58.2	61.0	55.7	.444	.827	10	S.	Ag. morn. Showery afternoon.
20	42.8	54.8	30.8	.171	.398	0	N.	0.2	57.0	61.0	53.4	.409	.762	5	S.	Pleasant morn. Del. afternoon.
21	42.0	48.8	34.5	.200	.580	2	S.	0	54.8	60.2	49.9	.360	.690	5	S.	Del. morn.; very mild. Pleasant afternoon.
22	42.5	48.8	35.6	.209	.606	0	S.	0	51.5	62.2	41.9	.266	.475	8	S.W.	Sharp morn. Del. afternoon; mild.
23	46.0	51.2	40.8	.255	.676	10	N.	0	48.2	50.2	46.0	.311	.854	5	S.E.	Ag. morn. Beautiful afternoon.
24	39.8	40.0	39.5	.243	.980	10	E.	0.9	45.5	46.2	44.7	.296	.946	10	E.	Heavy rain all morn. Torrents of rain all day.
25	50.0	54.8	45.2	.302	.702	8	S.W.	0.85	48.2	52.8	43.6	.284	.710	8	S.	Ag. morn. Del. afternoon.
26	42.5	48.8	35.6	.209	.606	2	S.	0	58.2	60.0	56.6	.459	.886	2	S.	Del. morn. Beautiful afternoon.
27	48.5	52.0	45.0	.299	.771	8	S.	0	54.2	58.8	50.1	.362	.730	8	S.	Pleasant morn. Del. mild afternoon.
28	44.2	44.5	43.8	.286	.973	10	S.	0	48.0	48.2	47.8	.333	.985	10	S.	Disagreeable morn.; heavy rain all day.
Sums -	1211.5	1383.7	-	-	-	122	-	8.205	1434.7	1585.9	-	-	-	186	-	-
Means -	43.3	49.4	36.6	.217	.615	-	-	-	51.2	56.6	46.3	.314	.684	-	-	-

(signed) J. McKay.

Day of the Month.	OBSERVATIONS TAKEN AT 9.30 A.M.										OBSERVATIONS TAKEN AT 3.30 P.M.										REMARKS.
	Wet Bulb Thermometer.	Dry Bulb Thermometer.	Dew Point Computed.	Elastic Force of Vapour.	Humidity.	Rain.	Cloud.	Wind.	Wet Bulb Thermometer.	Dry Bulb Thermometer.	Dew Point Computed.	Elastic Force of Vapour.	Humidity.	Rain.	Cloud.	Wind.					
1	46.8	47.0	46.6	.318	.985	2.725	10	N.	46.8	50.5	43.1	.279	.758	-	10	N.	Heavy rain all night, and during day.				
2	43.0	43.0	43.0	.278	1.000	3.225	10	N.	45.0	45.0	45.0	.299	1.000	-	10	N.	Disagreeable morn. Torrents of rain all day.				
3	43.5	43.5	43.5	.283	1.000	4.950	8	N.	46.8	46.8	46.8	.320	1.000	-	10	N.	Heavy rain all day. Dense fog in evening.				
4	45.8	48.8	42.5	.272	.788	1.225	10	N.	55.8	60.0	60.0	.338	.749	-	5	S.	Hail in morn. Del. afternoon; very mild.				
5	50.0	56.8	43.9	.287	.621	0	8	S.	50.8	54.5	47.1	.324	.762	-	8	N.	Beaut. morn. Ag. afternoon; a few drops of rain.				
6	44.0	48.8	38.7	.235	.681	0	0	S.	58.8	60.2	57.5	.474	.908	-	8	N.	Sharp morn. Pleas. afternoon; hail in evening.				
7	44.8	48.5	40.7	.254	.745	0.1	0	N.	55.5	60.0	51.4	.380	.734	-	5	N.	Del. morn. Afternoon very mild.				
8	46.0	53.5	38.5	.234	.571	0	2	N.	58.8	60.8	57.0	.466	.874	-	0	N.	Beaut. morn. Pleas. afternoon.				
9	44.8	58.0	32.9	.188	.390	0	0	N.	60.0	66.2	55.0	.433	.672	-	2	N. W.	Ag. morn. Beaut. afternoon.				
10	48.5	54.8	42.2	.269	.626	0	8	S. W.	54.5	60.0	49.5	.354	.683	-	10	S.	Beaut. morn. Del. mild afternoon.				
11	48.5	49.0	47.9	.334	.960	0	10	S.	50.2	50.5	49.9	.360	.978	-	10	S. W.	Threat. in morn. Disagreeable afternoon; heavy rain.				
12	45.8	48.5	42.8	.276	.809	1.175	10	S. E.	55.5	60.8	50.7	.376	.694	-	5	S.	Disagreeable morn. Driz. rain. Del. afternoon.				
13	44.5	50.0	38.4	.233	.645	0.05	5	W.	55.5	65.8	47.3	.326	.513	-	5	S. W.	Sharp morn. Heavy dew. Beaut. afternoon.				
14	48.5	54.5	42.5	.272	.640	0	5	S.	60.0	66.8	54.6	.427	.650	-	0	S. W.	Beaut. morn. Pleas. afternoon.				
15	48.8	56.5	41.9	.266	.580	0	0	N.	58.8	65.5	53.4	.409	.651	-	0	N.	Del. morn. Ag. afternoon; very mild.				
16	52.0	60.5	44.3	.292	.554	0	2	S.	58.8	68.5	51.0	.374	.537	-	0	S.	Ag. morn. Beaut. afternoon.				
17	53.0	63.0	44.0	.288	.500	0	0	S.	55.2	64.5	47.8	.333	.549	-	0	S.	Beaut. morn. Pleas. afternoon.				
18	55.0	66.5	45.8	.309	.475	0	0	S.	58.8	68.2	51.3	.378	.549	-	0	S.	Del. morn. Beaut. afternoon; very mild.				
19	58.5	62.5	54.9	.432	.763	0	0	N.	60.0	68.8	53.0	.403	.572	-	0	S.	Del. morn. Ag. afternoon.				
20	50.8	58.8	43.6	.284	.573	0	0	N.	60.8	67.5	55.4	.439	.652	-	0	S.	Ag. morn. Beaut. afternoon.				
21	50.5	60.8	41.2	.259	.486	0	0	N.	58.5	68.2	50.7	.370	.537	-	0	S.	Beaut. morn. Del. afternoon; mild.				
22	57.2	63.5	51.5	.381	.650	0	2	S. W.	60.5	75.5	50.0	.361	.409	-	5	S. W.	Del. morn. Hazy; beaut. afternoon.				
23	59.2	75.8	47.6	.330	.370	0	2	S. E.	64.5	75.2	57.0	.466	.534	-	2	S.	Beaut. morn. Pleas. afternoon.				
24	48.8	60.2	38.5	.234	.448	0	0	N.	60.2	75.0	49.8	.358	.412	-	2	S.	Ag. morn. Beaut. afternoon.				
25	53.8	73.0	38.4	.233	.287	0	2	S.	59.5	67.8	52.9	.401	.589	-	2	S.	Del. morn. Ag. afternoon.				
26	58.2	68.5	50.0	.361	.518	0	0	S. E.	70.0	77.5	64.7	.611	.648	-	2	S.	Beaut. morn. Del. afternoon; very mild.				
27	60.0	70.2	51.8	.386	.523	0	2	S.	65.2	75.8	57.8	.479	.538	-	0	S.	Del. morn. Beaut. afternoon.				
28	60.0	73.5	50.5	.368	.446	0	0	N.	70.0	78.5	64.0	.596	.612	-	0	S.	Pleas. morn. Del. afternoon; very warm.				
29	65.2	69.8	61.5	.546	.750	0	0	S. E.	68.8	78.5	62.0	.556	.571	-	0	S. W.	Del. morn. Pleas. afternoon; very warm.				
30	59.5	64.2	55.3	.438	.730	0	0	N.	71.2	80.5	64.7	.611	.588	-	0	S.	Beaut. morn. Afternoon, sun very warm.				
31	54.8	68.2	44.1	.289	.419	0	0	N.	72.1	85.2	62.9	.574	.474	-	2	S.	Del. morn. Beaut. afternoon.				
Sums	1589.8	1820.2	-	-	-	13.450	91	-	1820.9	2048.6	-	-	-	-	103	-					
Means	51.3	58.7	44.6	.295	.596	-	-	-	58.9	66.1	53.1	.404	.630	-	-	-					

Latitude, 32° 7' 8" N.; Longitude, 102° 2' 0" W.

New Quito, 31 March 1865.

(signed) J. McKay.

(signed) J. McKay.

New Quito, 31 March 1865.

— VI. —

CHINCHONA CULTIVATION IN THE BOMBAY PRESIDENCY.

— No. 1. —

EXTRACT of a DESPATCH from the Secretary of State for India to the Government of Bombay.

31 December 1862.

5. I DESIRE that you will furnish me with a Report of the experimental sowing of Chinchona seeds at Mahabaleshwur, which were sent there by Mr. Dalzell in 1861.

— No 2. —

EXTRACT from the ANNUAL REPORT on the Hill Station of Mahabaleshwur, Bombay, for 1863, by Dr. *H. Cook*, Superintendent.

20 February 1864.

THE site for the Chinchona plantation has been fixed at Lingmulla, on the banks of the Yenna, above the waterfall. I was induced to select this spot, as it seemed to offer all, or nearly all, the natural advantages essential to the success of the cultivation of the Chinchona. These are briefly, a northern aspect, the disposal of the ground in narrow terraces, protection from prevalent winds, a good soil and subsoil, a plentiful supply of running water, and the least possible rainfall. As the rainfall at Sindola Park is 60 inches less than that at Malcolm-penth, and as a high peak intervenes between this and Lingmulla, I am hopeful that the rainfall at the latter place will not exceed 150 inches. If this prove to be the fact, there need be no fear of the success of the experiment. A house for the local superintendent of the plantation, propagating houses, &c. are to be immediately constructed, and if the sanction of the Government to construct a good branch road from the Paunchganny-road to the site be obtained, this lovely spot will, I feel sure, become a favourite place of resort to visitors, and an added charm to the station.

— No. 3. —

EXTRACT of a DESPATCH from the Secretary of State for India to the Government of Bombay.

16 December 1864.

THE reference made by Dr. Cook to the plantation of Chinchona, at Lingmulla, leads me to hope that the experiment will be successful. In paragraph 5 of my Despatch of the 31st of December 1862, I desired that I might receive a Report on the Chinchona seeds sent by Mr. Dalzell to Mahabaleshwur, in 1861. None has yet been sent, and I have to desire that you will supply the omission.

— No. 4. —

EXTRACT from the ANNUAL REPORT on the Hill Station of Mahabaleshwur, Bombay, for 1864, by Dr. *H. Cook*, Superintendent.

23 January 1865.

THE Chinchona plantation at Lingmulla, which was commenced last year, has been established. The plants have thriven, and many of them have attained a height of above three feet. The services of a soldier from the Artillery, who understands gardening, has been granted by Government.

— No. 5. —

From the Bombay Government to the Secretary of State for India.

Bombay Castle, 28 February 1865.

WITH reference to your Despatch, dated the 16th December last, we have the honour to transmit herewith copies of the papers noted in the margin, showing the progress of the Chinchona plants since grown at Mahabaleshwur.

Memorandum from the Acting Revenue Commissioner S. D., 3 February 1865, with accompaniments.

Resolution of Government on the above, 15 February 1865.

Enclosure in No. 5.

From Dr. *H. Cook*, Superintendent at Mahabaleshwur, to *F. S. Chapman*, Esq., Collector of Sattara.

Sir,

Mahabaleshwur, 24 January 1865.

I HAVE the honour to forward for your information, and for transmission to Government, the accompanying two monthly Returns of the growth of the Chinchona plants at Lingmulla, the one for the month of November and the other for that of December last.

MONTHLY RETURN of the Growth of Chinchona Plants at Lingmulla for the Month of November 1864.

No.	Height in Inches.	No.	Height in Inches.
1	9½ Inches.	32	1 Foot and 1½ inch.
2	5 Ditto.	33	1 Ditto 11 inches.
3	1 Foot and ½ inch.	34	2 Feet and 7 "
4	1 Ditto 1 inch.	35	1 Foot and 8 "
5	9 Inches.	36	2 Feet.
6	1 Foot and 1 inch.	37	1 Foot and 6 inches.
7	5 Inches.	38	1 Ditto.
8	9 Ditto.	39	1 Ditto and 6½ "
9	9 Ditto.	40	1 Ditto and 7 "
10	10 Ditto.	41	1 Ditto and 8 "
11	1 Foot and 5 inches.	42	2 Feet.
12	6½ Inches.	43	2 Ditto and 11 inches.
13	1 Foot and 1½ inch.	44	2 Ditto.
14	10⅛ Inches.	45	2 Ditto and 1½ inch.
15	1 Foot and 6 inches.	46	2 Ditto.
16	1 Ditto 8 "	47	2 Ditto and 1 inch.
17	3 Feet.	48	2 Ditto.
18	10 Inches.	49	2 Ditto.
19	1 Foot and 8 inches.	50	1 Foot and 6½ inches.
20	1 Ditto 4 "	51	11 Inches.
21	11 Inches.	52	1 Foot.
22	1 Foot and 8 inches.	53	1 Ditto.
23	1 Ditto 4 "	54	11½ Inches.
24	1 Ditto 4½ "	55	1 Foot and ½ inch.
25	1 Ditto 7½ "	56	1 Ditto and 11½ inches.
26	2 Feet.	57	2 Feet and 4 "
27	1 Foot and 9 inches.	58	2 Ditto.
28	1 Ditto 9 "	59	
29	1 Ditto 5½ "	60	
30	2 Feet.	61	
31	1 Foot.	62	

L. Gillingwater,
Acting Assistant Superintendent, G.B.G.,
Chinchona Plantation, Lingmulla.

Lingmulla, 1 December 1865.

MONTHLY RETURN of the Growth of Chinchona Plantation at Lingmulla for the Month of December 1864.

No.	Height in Inches.	No.	Height in Inches.
1	1 Foot.	31	1 Foot and $5\frac{1}{2}$ inches.
2	8 Inches.	32	1 Ditto and $6\frac{1}{2}$ "
3	1 Foot and 3 inches.	33	2 Feet and $3\frac{1}{2}$ "
4	1 Ditto 5 "	34	2 Ditto 11 $\frac{1}{2}$ "
5	1 Ditto $1\frac{1}{2}$ "	35	1 Foot and $11\frac{1}{4}$ "
6	1 Ditto 4 "	36	2 Feet and $5\frac{1}{2}$ "
7	7 Inches.	37	1 Foot and $10\frac{1}{2}$ "
8	1 Foot.	38	1 Ditto and $6\frac{1}{8}$ "
9	1 Ditto.	39	1 Ditto and $10\frac{1}{2}$ "
10	1 Ditto and 1 inch.	40	2 Feet.
11	1 Ditto and 10 inches.	41	1 Foot and $11\frac{1}{2}$ "
12	$8\frac{1}{2}$ Inches.	42	2 Feet and $7\frac{1}{2}$ "
13	1 Foot and $4\frac{1}{8}$ inches.	43	3 Ditto 4 "
14	1 Ditto $\frac{1}{2}$ "	44	2 Ditto 5 "
15	1 Ditto $10\frac{1}{2}$ "	45	2 Ditto $5\frac{1}{8}$ "
16	1 Ditto $11\frac{1}{2}$ "	46	2 Ditto $5\frac{1}{2}$ "
17	3 Feet and $1\frac{1}{4}$ "	47	2 Ditto $6\frac{1}{2}$ "
18	1 Foot and $1\frac{1}{2}$ "	48	2 Ditto $7\frac{1}{4}$ "
19	2 Feet.	49	2 Ditto $5\frac{1}{2}$ "
20	1 Foot and $7\frac{1}{2}$ "	50	1 Foot and $10\frac{1}{2}$ "
21	1 Ditto and $3\frac{1}{4}$ "	51	1 Ditto $5\frac{1}{8}$ "
22	2 Feet and $\frac{1}{8}$ "	52	1 Ditto $3\frac{1}{4}$ "
23	1 Foot and 11 "	53	1 Ditto $2\frac{1}{2}$ "
24	1 Ditto and $10\frac{1}{2}$ "	54	1 Ditto $1\frac{1}{3}$ "
25	1 Ditto and $11\frac{1}{4}$ "	55	1 Ditto $5\frac{1}{2}$ "
26	2 Feet and $2\frac{1}{4}$ "	56	2 Feet and $7\frac{1}{2}$ "
27	2 Ditto and $1\frac{1}{2}$ "	57	2 Ditto $8\frac{1}{3}$ "
28	2 Ditto and $1\frac{1}{8}$ "	58	2 Ditto 1 "
29	1 Foot and $8\frac{1}{2}$ "	59	Without leaf.
30	2 Feet and $2\frac{1}{2}$ "	60	Ditto ditto.

L. Gillingwater,
Acting Assistant Superintendent, G.B.G.,
Chinchona Plantation, Lingmulla.

Lingmulla, 1 January 1865.

— No. 6. —

EXTRACT from the ANNUAL REPORT on the Hill Station of Mahabaleshwur,
Bombay, for 1865, by Dr. *H. Cook*, Superintendent.

9 February 1866.

THE Chinchona plantation established last year has progressed favourably. At the close of the year 1864 there were 60 young plants; these have been increased to 270 by layering 40 of their number. This system of propagation is necessarily slow, but, in the absence of a propagating house, it is the only one that has been found to succeed. As the new propagating house will soon be finished, I trust that the number of young plants will hereafter rapidly increase. Twenty of the original stock, planted on the 18th February 1864, have been allowed to grow up, and some of them have already attained a height of six feet. The average growth of these 20 plants during the year have been 3 feet $2\frac{3}{4}$ inches. The average growth of 11 plants at Neddiwuttum, on the Neilgherries, has been for the past three years only 2 feet 9 inches. If, therefore, the present rate of growth is continued at Lingmulla, it will exceed that of the Neilgherry plants.

RESOLUTION of the Bombay Government.

The report as to the growth of Chinchona plants at Lingmulla is very satisfactory; it is hoped that no time will be lost in completing the propagating house.

— VII. —

CHINCHONA CULTIVATION IN CEYLON.

— No. 1. —

EXTRACT from the REPORT on the Royal Botanic Garden at Peradenia, Ceylon,
by Mr. *Thwaites*, F.R.S. (Director).

September 1864.

CHINCHONAS.—Complete success is attending the cultivation and propagation of the different species of Chinchonas now growing in the Hakgalle Garden. The plants exhibit the most perfect condition of health and vigour, and the number of each kind in the following list furnished to me by Mr. MacNicoll shows how successful he has been in their propagation.

LIST of Chinchona Plants in the Hakgalle Garden.

<i>Chinchona succirubra</i> , planted out in the forest	-	-	-	-	-	1,345
(The largest plant being 13½ feet high, and the stem at the base 8½ inches in circumference.)						
Ditto	Stock plants, for taking cuttings from	-	-	-	-	2,380
Ditto	Plants ready for distribution	-	-	-	-	42,450
Ditto	Cuttings in different stages of rooting	-	-	-	-	32,800
<i>Chinchona officinalis</i> , planted out in the forest	-	-	-	-	-	1,044
(The largest plant being 6½ feet in height, and the stem at the base 5½ inches in circumference.)						
Ditto	Stock plants, for taking cuttings from	-	-	-	-	1,934
Ditto	Plants ready for distribution	-	-	-	-	58,747
Ditto	Cuttings in different stages of rooting	-	-	-	-	47,400
<i>Chinchona crispella</i> (not distinguishable from <i>C. officinalis</i>) planted out in the forest	-	-	-	-	-	430
<i>Chinchona micrantha</i> , planted out in the forest	-	-	-	-	-	300
Ditto	Stock plants, for taking cuttings from	-	-	-	-	320
Ditto	Cuttings in different stages of rooting	-	-	-	-	229
<i>Chinchona Calisaya</i> , Stock plants, for taking cuttings from	-	-	-	-	-	82
Ditto	Cuttings in different stages of rooting	-	-	-	-	24
<i>Chinchona Pahudiana</i> , Stock plants, for taking cuttings from	-	-	-	-	-	24
Ditto	Cuttings in different stages of rooting	-	-	-	-	12

It having been determined by Government that plants of Chinchonas should be distributed, to the extent they could be spared, free of charge to persons residing in the island making applications for them in the following form:

“ I., *A. B.*, possessing (*or* having under my care) available land at _____, suitable for the cultivation of Chinchona, beg to apply for _____ plants, which I undertake to plant upon the said land within 12 months from this date, and to carefully cultivate when so planted.”

It is satisfactory to me to be able to report that I have already received applications in the above prescribed form from eighteen planters, and that the aggregate number applied for by them is 28,524: of this number nearly 9,000 have been issued from Hakgalle, and it will be seen by the foregoing list that there will be no difficulty in supplying the remainder at once. I have reason

to believe that I shall, before long, receive applications for many more plants, and I have no fear of being unable to meet them, as Mr. MacNicoll informs me he can furnish plants at the rate of 20,000 per month, if they are required.

The small number of plants of *Chinchona succirubra* growing in the open ground at Peradenia, are making great progress, and are in perfect health, though not so robust in character as plants of the same age at Hakgalle.

A few plants of *Chinchona officinalis*, which were planted by way of experiment at Newera Ellia, were destroyed by a temperature of 24° Fahr. in one of the cold nights of February last, so that it is quite clear it would not be safe to plant Chinchonas in the island much above the elevation of 5,000 feet, or where they would be liable to frosty nights succeeding the exceedingly hot days of the dry season.

I have transmitted to Sir William Hooker, who has kindly promised to have it submitted to analysis for me, a small quantity of bark of *Chinchona succirubra*, from a tree three years old, and I hope to be able to communicate the results in a short time. Dr. De Vry, professional chemist to the Chinchona plantations of Java, who favoured me with a visit a few months ago, took to Europe with him some bark from a tree at Hakgalle which had died, owing to the roots getting into swampy undrained ground, and he found even in this unpromising specimen of bark, more than two per cent. of alkaloids, and of this nearly one per cent. of quinine.

I regret to say that some seeds of *Chinchona Pitayensis*, obligingly sent to me by Mr. Clements R. Markham, in March last, failed altogether to germinate.

— No. 2 —

EXTRACT from the REPORT on the Royal Botanic Garden at Peradenia, Ceylon, by Mr. Thwaites, F. R. S. (Director).

October 1865.

CHINCHONAS.—Again am I able to give highly satisfactory accounts of the progress made in the cultivation of Chinchonas in the island. Many thousands of plants have been distributed from the Hakgalla Garden, and I have received from the various parts of the island where they have been planted, most favourable reports of their perfect health and vigorous growth; and not a single report of an opposite character has yet reached me: so that there appears to be every prospect of quinine becoming, before very long, one of the most important products of the island.

Mr. MacNicoll has been hitherto able to keep up a sufficient supply of healthy, well-rooted plants to meet the demand which has been made at Hakgalla for them. He has supplied 39 applicants, presenting orders from me, with 129,350 plants, in the proportion of three-fourths of *C. succirubra* and one-fourth of *C. officinalis*.

Up to the present date I have received applications, in the prescribed form, from 43 persons, for altogether 439,274 plants. Three of the applicants requested each to have as many as 100,000 allotted to them, if such a number could be spared. Plants are distributed without stint to the utmost extent of the capabilities of the Hakgalla Garden. I would suggest, however, to persons who may have an intention of cultivating Chinchonas very extensively, that it would be very desirable for them to establish nurseries upon their estates, for the propagation of the plant by cuttings. The operation is a very simple one, and an ordinary cooly labourer could be taught it in a few days at Hakgalla, whither he might be sent for the purpose.

LIST of Chinchona Plants now in Hakgalla Garden.

<i>Chinchona succirubra</i> , planted out (the largest plant being 17 feet in height and the trunk 12½ inches in circumference at the base)		1,345
Ditto	Stock plants for taking cuttings from	2,380
Ditto	Plants fit for distribution	63,158
Ditto	Small plants and cuttings in different stages of growth	78,290

Chinchona

<i>Chinchona officinalis</i> , planted out	- - - - -	1,044
Ditto - Stock plants for taking cuttings from	- - - - -	1,934
Ditto - Plants fit for distribution	- - - - -	109,845
Ditto - Small plants and cuttings in different stages of growth	- - - - -	93,880
<i>Chinchona crispella</i> , (not distinguishable from <i>C. officinalis</i>) planted out		430
<i>Chinchona micrantha</i> , planted out	- - - - -	600
Ditto - Small plants and cuttings	- - - - -	612
<i>Chinchona Calisaya</i> , planted out	- - - - -	100
Ditto - Small plants and cuttings	- - - - -	261
<i>Chinchona Pahudiana</i> , planted out	- - - - -	25
Ditto - Small plants and cuttings	- - - - -	122

I have not yet received from Kew the result of Mr. Howard's analysis of the specimens of *Chinchona* bark from Hakgalla and from this garden, which were sent to England some months ago. As soon as it reaches me, I shall make it known without loss of time.

Several of the plants of *Chinchona officinalis* at Hakgalla are producing seeds, and one plant of *C. succirubra* is coming into flower.

Some seeds of *C. officinalis* collected at Loxa, and sent to me from Kew, have unfortunately not germinated.

I am not losing sight of the importance of ascertaining, as soon as possible, firstly, the period of growth at which the bark may be most profitably removed from the different species of *Chinchona* respectively; secondly, the best season for removing it; and thirdly, in what state it is desirable it should be sent to Europe; whether merely dried and carefully packed, and, if so, how this may be best accomplished; or whether, as was suggested to me by Dr. De Vry, some preliminary simple chemical process may not be carried out in the island, which, by eliminating what is of no value, may very much reduce the bulk of the article to be exported. As soon as I succeed in getting any reliable information on these points, I shall lose no time before communicating it.

— No. 3. —

From Mr. Clements R. Markham to the Colonial Secretary, Ceylon.

Sir,

Colombo, 18 November 1865.

I HAVE the honour to inform you that I have inspected the *Chinchona* Plantation at Hakgalla, and one of the large coffee estates (that of Rothschild) where several acres have been planted with *Chinchona*, in company with Mr. Thwaites. The site of the plantation at Hakgalla has been so admirably selected, and resembles so closely the native habitat of the *Chinchona* in South America, that the healthy growth of the plants there must have been a certainty from the first, and the skill of Mr. MacNicoll in propagating has already made Hakgalla a thoroughly efficient nursery for the supply of a practically unlimited number of plants. This portion of the work is in such excellent hands that it would be presumptuous on my part to offer any suggestions, even if I had any to make; but it has occurred to me that the information derived from the analysis of bark in England, and the deductions obtained from it with regard to the probable commercial advantages of *Chinchona* cultivation, might advantageously be furnished to individuals who have embarked in this important enterprise, from time to time.

2. I shall take care that, in future, all papers on this subject are transmitted to Ceylon without delay; and in the meanwhile it may be useful that I should offer some remarks on the cultivation which has been so generally entered upon by the enterprising planters of Ceylon, with special reference to the recent scientific investigations by Mr. Howard, the great quinine manufacturer in London.

3. I am informed by Mr. Thwaites that as many as 500,000 *Chinchona* plants have been applied for, and that 180,000 have actually been distributed, so that there is clearly a serious intention among the planters to make *Chinchona* bark

one of the staple products of the island. On the Rothschild estate several acres are planted with trees of the *Succirubra* or "red bark" species, and, though fully exposed to the effects of the sun and wind, on a hill-slope, denuded of trees, they now present an exceedingly robust and healthy appearance. The span of the branches, the condition of the leaves, and the girth of the stems, all indicate vigour of growth which promises the best results for the future, and although these plants are only 3,200 feet above the sea, there is reason to hope that an analysis of their bark will show a yield but little less favourable than that obtained from bark grown on the Neilgherry Hills in Southern India. I propose, therefore, to state briefly, and in general terms, the results of four successive experiments which have been made on barks sent home from the Neilgherries, in order that some idea may be formed of the probable yield from barks of the same species grown in Ceylon.

4. In May 1863 some bark was cut at a period when the sap was beginning to rise. The product of rough alkaloids in this bark proved to be 4·3 per cent., of purified alkaloids 3·4 per cent., of which 2·4 was quinine. On this occasion, Mr. Howard remarked that the bark cutting should take place as soon as the bark is thick enough to repay cultivation, and that there is positive disadvantage in allowing bark to attain the age indicated by the samples imported from South America, because there is a continual process of deterioration after a certain period in the bark's history. The point to ascertain is the exact time when it has reached its fullest stage of development.

5. The second analysis by Mr. Howard was of bark taken in October 1863, during the rains, when the sap is in full flow. This bark, 18 months old, yielded 6 per cent. of rough and 5 of purified alkaloid. In the following month the bark of a *C. succirubra* tree, aged one year and six months, was delivered to Dr. De Vry, the eminent Dutch chemist. It had been thickened by moss, and he obtained the hitherto unprecedented yield of 8·4 per cent. of alkaloids, of which 2·7 was quinine.

6. The third analysis by Mr. Howard was of bark taken in February 1864, when the plants were in a state of rest. Two lower branches were removed from a plant which had been in the ground for two years and five months, and they yielded 8½ ounces of dry bark. This bark contained 6 per cent. of purified alkaloids, of which 3·14 was quinine, 2·06 chinchonidine, and 0·80 chinchonine. Mr. Howard considered that this large yield might be still further increased by surrounding the stems with moss, and he also came to the conclusion that February was the most favourable time for taking the bark.

7. The fourth and most recent analysis was of bark cut early in April 1865, at the time when the sap begins to rise. It was found that the system of removing strips of bark from the stem can be practised without injury, provided that the wound is instantly covered with damp moss. This bark contrasted most favourably with the average specimens from South America. It was three years and five months old, and had been thickened by the application of moss. The alkaloids were in a state of purity such as is not found in South American red barks, and it was evident that cultivation had improved the yield of this species. Mr. Howard, on this occasion, used the analysis which is followed to ascertain the commercial value of the bark, depending chiefly on the amount of crystallizable sulphates. His result was eight per cent. of alkaloids, of which six per cent. was crystallized sulphate, 0·94 soluble in ether, and 1·06 insoluble. Dr. De Vry, who was furnished with some of the same bark, adopted a method of analysis which gave him the total amount of febrifuge alkaloids. He pronounced it to be the most valuable specimen he had ever manipulated, and obtained the extraordinary yield of 11 per cent. of alkaloids! Another very important point in this investigation was the analysis of bark re-produced on a portion of the stem which had yielded the bark given to Dr. De Vry, in November 1863. This second harvest of bark was thus one year and five months old, and it yielded 7·7 per cent. of alkaloids, of which five per cent. was crystallizable sulphates. During the summer of the present year, Mr. Howard has also analysed bark of *C. officinalis* at an age of one year and seven months, which gave 1·5 per cent. of alkaloids; and bark of *C. micrantha* two years and five months old, thickened by moss, which yielded as much as 5·82 of crystallized sulphate of quinidine.

8. The highly promising results of these several investigations of bark grown on the Neilgherry Hills are manifest, and the following deductions may be drawn from them. 1. That the yield of chinchona plants under cultivation increases two and threefold, even during the first three years of growth, as compared with the yield of barks imported from South America. 2. That not only may a large yield be obtained from branches lopped from the tree, but that strips may even be taken from the stem, without injury to the tree, provided that damp moss is placed on the wound immediately. 3. That the application of damp moss tends materially to thicken the bark. 4. That bark from the young branches of *C. officinalis*, of plants only a year and a half old, is recognised by experienced dealers in London as identical with the famous "thin rusty crown" of commerce, which fetches 1 s. 3 d. to 1 s. 4 d. per lb., and is generally used by chemists in making the various preparations of Peruvian bark. 5. That the bark of *C. micrantha*, which produces Chinchonine and nothing else in its wild state, has under cultivation been brought to yield the far more valuable febrifuge called quinidine. 6. That the red bark of India and Ceylon will fetch as high a price as the *Calisaya* of Bolivia, the most valuable of all the barks (4 s. per lb.).

9. It has often been suggested that the bark might be greatly reduced in bulk for transmission to the London market, by adopting some cheap chemical process, with a view to eliminating the woody and other useless parts. Mr. Howard, however, is of opinion that it would not be profitable to bring the bark into a smaller bulk for facility of transport. His reasons are founded partly on the complexity of the organic constituents of the bark, leading (especially under the influence of lime or alkalis) to deteriorating changes in the alkaloids, and partly on the tendency of the heat to which the bark must be subjected, to operate in the same direction.

10. There is another point to which I think it particularly important that the attention of the Government of Ceylon should be directed. There are four febrifuge substances in Chinchona bark, found in larger or smaller proportions according to the species. These are quinine, quinidine, chinchonidine, and chinchonine. At present, the first of these is alone of great commercial value. Yet it is the opinion of the most eminent chemists in Europe that quinidine and chinchonidine are of nearly equal efficacy, while chinchonine is by no means devoid of febrifuge virtue. The presence of these alkaloids, other than quinine, is at present, therefore, a disadvantage in a commercial, but not in a medicinal point of view; and looking to the large yield of chinchonidine in our *C. succirubra*, and of quinidine in our *C. micrantha* plants, it becomes a matter of the utmost importance to clear away all prejudice and error on this point. Chinchonidine, I may remark in passing, was undoubtedly the therapeutic agent in the famous cure of the Countess of Chinchon in 1639, who gave her name to the genus, and its febrifuge value has been recognised by the late Dr. Royle, by M. Briquet, the eminent French quinologist, by Mr. Howard, and by Dr. De Vry. The true position of these febrifuges may be established by appointing commissions, consisting of medical men, to report upon them; and with this view the Secretary of State for India has issued the instructions contained in the enclosed despatch to the Madras Government, dated 30th September 1865, to which I would venture to invite particular attention. A similar measure adopted by the Ceylon Government might materially assist the common object in view.

11. From paragraphs 4 to 8 of the same despatch, it will be seen that it is contemplated to establish a manufactory of some cheap form of the Chinchona febrifuge in India. I am aware that measures of this nature do not come within the scope of the Ceylon undertaking, and I have therefore confined myself in this letter to points, which appear important to planters, who cultivate with a view to commercial profit. In this point of view the enterprise is, however, a very important one, likely to advance the prosperity of the colony, and to prove a material blessing to its inhabitants.

12. A periodical analysis of the bark actually grown on coffee estates from 3,000 to 4,500 feet above the sea, is very essential, in order that cultivators may see their way; and I would strongly recommend that they should be made aware of the importance of this measure. In conclusion, I must express my admiration at the zeal and ability with which this great undertaking has been

conducted by Mr. Thwaites and his assistant Mr. MacNicoll; and at the thorough efficiency of the plantation at Hakgalla, which so completely secures the objects contemplated by the Government.

I have, &c.
(signed) *Clements R. Markham.*

The Honourable the Colonial Secretary, Colombo.

P.S.—I also beg to enclose a copy of Mr. Howard's most recent report of an analysis of Chinchona bark which is referred to in the despatch from Sir Charles Wood. Portions of the information might advantageously be printed and circulated for general information.

— No. 4. —

Mr. Clements R. Markham to the Under Secretary of State for India.
Report on Chinchona Cultivation in Ceylon.

Sir,

Colombo, 18 November 1865.

I HAVE visited and inspected the Government Chinchona plantation in Ceylon, as well as some of the coffee estates where the cultivation has been undertaken, and now have the honour to report the results of my observations. The Secretary of State in Council will thus be fully informed respecting the position and prospects of the experiment in Ceylon, when questions relating to Chinchona cultivation in India are submitted for consideration.

2. The plants in Ceylon, with the exception of those of *C. Calisaya*, which came from Java, are entirely derived from seeds procured from South America under my superintendence, at the expense of the India Office, and the Ceylon cultivation may therefore be considered as a branch of the great undertaking which has been successfully carried out under the auspices of the Secretary of State for India.

3. In Ceylon, the Chinchona experiment is under the able superintendence of Mr. Thwaites, the Director of the Botanical Garden at Peradenia, and the cultivation is conducted, under him, by Mr. M'Nichol, a very intelligent gardener, who resides on the spot. The first plants arrived in 1861, when the site for a plantation was selected by Mr. Thwaites, and the work commenced.

4. The knot of mountains in the central province of Ceylon, which at one point attains a height of 8,280 feet above the sea, is entirely composed of gneiss with veins of quartz. The soil formed by the disintegration of this rock is not rich, not to be compared with the fertile loam produced by the more modern volcanic rocks of Java, but this poverty of soil is made up for by abundant supplies of water and a genial climate. The valleys formed by the mountain spurs are extensively cleared and planted with coffee, but there is still a good deal of forest on the higher elevations, and on one of the highest plateaux is the hill station of Neuera-Ellia, 6,220 feet above the sea. From Kandy the mountains are ascended, on their northern face, by an excellent road, and, as Neuera-Ellia is approached, the *flora* resembles closely that of the Pulneys, or of the Neilgherries, near Coonoor. The woods are, like those of the Southern Indian hills, composed of *Michelia*, *Symplocos*, *Gaultheria*, *vaccinium*, myrtles, with an undergrowth of *Lobelia excelsa*, balsams, *Osbeckia* and *Sonerila*, *Solanum Indicum*, a passion-flower, and madder. Beautiful tree ferns grow in the shade, and the *Rhododendron arboreum* is scattered over the open grass land. The station, consisting of bungalows nestling amongst Australian trees, is on a plain, bounded on the east and west by tree-covered hills, crested here and there by bare ridges of gneiss. The masses of cryptogams on the branches and stems of the trees indicate the extreme dampness of the climate.

5. The Chinchona plantation is at a place called Hak-galle, six miles south of Neuera-Ellia, and 5,200 feet above the level of the sea. The position is admirably chosen. Hak-galle is a magnificent perpendicular cliff, rising out of a fine forest which clothes the steep slopes of the mountain. The site faces the north-east. It is protected from the full force of the south-west monsoon by the cliff, while it receives a good supply of rain during both seasons. Half a mile on the road towards Neuera-Ellia the effects of the north-east monsoon are

are lost, and about a mile in the other direction is the limit of the influence of the south-west monsoon. Thus Hak-galle is exactly situated so as to receive ample supplies of moisture throughout the year. No place in the East has so vividly reminded me of the Chinchona *pajonales* of Peru as the view from the Hak-galle plantation. A mountain torrent dashes through the wide ravine, and the hills on either side are clothed with alternate forest and grass land, while to the south are the distant hills and valleys of the Oovah district. These open grass lands, called *patenas* in Ceylon, are precisely analogous to the *pajonales* of Peru. They are of frequent occurrence in the Ceylon hills, being covered with coarse tufts of lemon grass (*Andropogon schænanthus*), and the forest stopping abruptly on their verge. No trees grow on these *patenas*, except the *rhododendron* and a very few others, and they are considered unsuitable for coffee cultivation. On the day of my visit to Hak-galle there were showers from the south-west in the forenoon, and in the afternoon a dense mist rolled up from the Oovah valleys to the east, and enveloped the plantation. This is exactly the course of atmospheric daily change in the uplands of Caravaya, and as I watched the white mist wrapping tree after tree in its thick folds, I almost fancied myself standing on a Chinchona *pajonel* in Peru.

6. Some eight or 10 acres have been cleared on the forest-covered slope under the grand old Hak-galle cliff, and about five are now planted with Chinchona trees. It is worthy of remark that, although the roots of the felled trees have been allowed to remain in the ground, the Chinchona have in no instance been attacked by fungi, as was the case in Java. The plants are completely in the open, and look remarkably healthy and vigorous. In the lower part of the clearing are the *C. succirubræ*, which average a height of from eight to 10 feet. Several are in flower. The largest tree is 18 feet 6 inches high, with a stem 14 inches in girth at the base. It was planted in February 1862. The *Calisaya* trees are smaller, but look healthy; and the *C. micranthæ* look remarkably strong. The *C. officinalis* trees, of which kind about 4,000 are planted out, are in the upper part of the clearing; they grow very fast, and have already yielded an abundant supply of seeds.

7. The nurseries for cuttings and young plants are beds containing many thousands placed close together, and merely shaded from the heat of the sun by a moveable roofing of grass. An ordinary cooly puts in the cuttings, and the loss only amounts to a half per cent.; 2,000 plants of *C. succirubra* have been raised from buds placed in drills, in the same way as French beans are raised, with half an inch of earth over them, and 90 per cent. came up; and of the *C. officinalis* seeds (30 in each capsule) all came up. The total number of plants and cuttings is now upwards of 500,000. With reference to the method of taking the bark, I found that a tree of *C. succirubra*, which was cut down at Hak-galle for bark analysis in April 1864, had, in November 1865, sent up another shoot perpendicularly from the side of the old stem, which was 5 feet high and 5 inches in girth near the ground.

8. The most cheering feature in the Chinchona cultivation of Ceylon is the hearty way in which it has been taken up by the coffee planters. The facility for acquiring good titles, the excellence of the roads, and other advantages, probably render them, as a body, more enterprising than their brethren in India, and this important experiment is evidently destined to receive a fair and complete trial at their hands. The plants are given away by the Government,* the only expense to the cultivator being their carriage to his estate. As many as 50 planters have made applications for plants, 500,000 plants have been asked for, and 180,000 actually distributed.

9. One of the most energetic Chinchona cultivators is Mr. Corbett, who manages the estate of Rothschild, at Pusilawe (on the road from Peradenia to Nuera-Ellia), for the Ceylon Company. It may be looked upon as a representative estate. The coffee plants occupy the slopes on both sides of the
Pusilawe

* The following form of application for Chinchona plants is in use in Ceylon:—

"I, A. B., possessing (or, having under my care) available land at _____, suitable for the cultivation of Chinchonas, beg to apply for _____ plants, which I undertake to plant upon the said land within 12 months from this date, and to carefully cultivate when so planted.

"Dated _____

"(signed) _____ A. B.

"To the Directors of the Royal Botanic Gardens, Peradenia."

Pusilawe valley, extending to the very crown of the grand hills of Mooneragalle, whose battlemented ridges of gneiss bound the view to westward. Excepting a clump of jacks high up on the eastern side, and some palms near the houses, every tree has been felled as far as the eye can reach, and rows of coffee plants entirely occupy the site of the primeval forest. No regard whatever has been paid to forest conservancy, belts of verdure are neither left along the watercourses nor on the hill tops, and planters have to send many miles for their firewood; yet there has been no sensible diminution of the water supply, and cascades and torrents dash over masses of rock through this coffee-covered valley.

10. About four acres have been planted with Chinchona trees on the Rothschild estate, on a steep hill slope, facing the east, all except one being of the red bark species. There are about 2,500 plants, or 600 to an acre, planted 12 feet apart, alternating with coffee bushes; they are fully exposed to the full blaze of the sun, yet nothing can be more vigorous and healthy than their appearance. The oldest had been in the ground nearly three years, and are 12 feet high and 8 feet across the branches, with stems 13 inches in girth near the ground; but the majority of the plants were about 20 months old, with stems eight inches in girth. Mr. Corbett is about to plant 600 acres with Chinchona plants at another estate, called Deek-oya, which is 4,000 feet above the sea. Rothschild only has an elevation of 3,200 feet. He has applied for 100,000 plants, and has already received 10,000; and he calculates that, after three years, the cost of cultivation will be 6 *l.* an acre, exclusive of original price of land and interest of money. This will ensure a very remunerative return on the sale of the bark.

11. The object of the Ceylon Government in establishing the Hak-galle plantation is confined to supplying Chinchona to individuals who are willing to undertake the cultivation, and the extensive plantations of the Neilgherries, where a far grander and more important system is contemplated, would therefore be out of place here. The expenditure on Hak-galle is only 500 *l.* a year, 250 *l.* of which is the salary of Mr. M'Nicholl, the gardener; but the Hak-galle plantation fully secures the object for which it was established; it is admirably managed by Mr. M'Nicholl, and it forms a most efficient source of supply for the issue of young plants. I have no doubt whatever that Chinchona cultivation, under the auspices of the enterprising planters of Ceylon, will prove a great commercial success, and be a benefit of no small value to the inhabitants of the island.

12. I sail for Tuticorin on the 19th instant, in a native small craft, in order to visit the pearl oyster nursery, and to deliver the instruments and instructions respecting the aquaria to Captain Phipps. Dr. Cleghorn, the Conservator of Forests, with the permission of Sir William Denison, is to meet me at Palamcottah, and to travel with me, by way of Travancore, to the Neilgherry Hills.

The Under Secretary of
State for India.

I have, &c.
(signed) *Clements R. Markham.*

— No. 5. —

REPORT ON Specimens of Chinchona Bark grown in Ceylon by
John Eliot Howard, Esq.

11 July 1866.

I HAVE the honour to report, for the information of Her Majesty's Government, on the four samples of bark received from Mr. Thwaites of Ceylon. I must remark, in the first place, that they contrast disadvantageously in appearance with the specimens of Chinchona bark received from Mr. McIvor. It looks as though the climate of Ceylon were less favourable than that of Ootacamund for the cultivation of this plant. No. 1 in particular, and next to this No. 3, would be considered poor and badly grown barks in commerce, and moreover they have not had the advantage of "mossing," which leads so much to increase the product

duct of the alkaloids. The yield, under these circumstances, is more favourable than I expected, especially from the *Condaminea* bark, concerning which it would be important to know whether it is the *C. officinalis* (var. *Uritusinga*) or some other variety.

No. 1. *C. succirubra* bark taken from trees growing in the forest under dense shade. Plants planted out 8th February 1862, yields,—

Sulphate of quinine -	-	-	-	-	-	-	-	1.48
Chinchonidine -	-	-	-	-	-	-	-	0.61
Chinchonine -	-	-	-	-	-	-	-	2.54
TOTAL - - -								4.63

The proportion of chinchonine in this sample is very remarkable. In the next the quinine and chinchonidine may be looked upon as more than doubled, and the chinchonine reduced by three-quarters.

No. 2. *C. succirubra* bark taken from trees growing in the open garden, planted 25 feet apart. Plants planted out 8th February 1862,—

Sulphate of quinine -	-	-	-	-	-	-	-	2.35
Uncrystallized quinine -	-	-	-	-	-	-	-	0.95
Chinchonidine -	-	-	-	-	-	-	-	1.11
Chinchonine -	-	-	-	-	-	-	-	0.58
TOTAL - - -								4.99

No. 3. *C. succirubra* bark taken from trees planted in the open garden, six feet apart. Plants planted out on 1st June 1863,—

Sulphate of quinine -	-	-	-	-	-	-	-	1.90
Uncrystallized quinine -	-	-	-	-	-	-	-	1.18
Chinchonidine -	-	-	-	-	-	-	-	0.53
Chinchonine -	-	-	-	-	-	-	-	0.32
TOTAL - - -								3.93

It seems, from these two last experiments, that the plants have done better six feet apart than 25 feet apart, having made more quinine in proportion to the time, and less chinchonine and chinchonidine. Further experiments are needed to confirm this conclusion.

No. 4. *C. Condaminea* (variety?). This has much the appearance of bark grown in Peru. The climate of Ceylon seems to suit it, which is quite probable, as the scorching heat of the sun, which destroys this plant, does not seem to injure the coarser texture of the large-leaved Chinchonæ. It is probable that a climate which does not suit the latter may be friendly to the former. It yields,—

Sulphate of quinine -	-	-	-	-	-	-	-	3.93
Uncrystallized quinine -	-	-	-	-	-	-	-	2.41
Chinchonidine -	-	-	-	-	-	-	-	0.51
Chinchonine -	-	-	-	-	-	-	-	0.28
TOTAL - - -								7.13

This is evidently the sort to cultivate in Ceylon, as there can be little doubt that, by attention, the uncrystallized quinine might be brought into a condition capable of crystallization. Indeed, I have no doubt that, with a larger sample of bark, I could even now have obtained a somewhat better result. The quantity sent over for examination was, in each case, less than 1,000 grains, and consequently not sufficient for very accurate analysis.

